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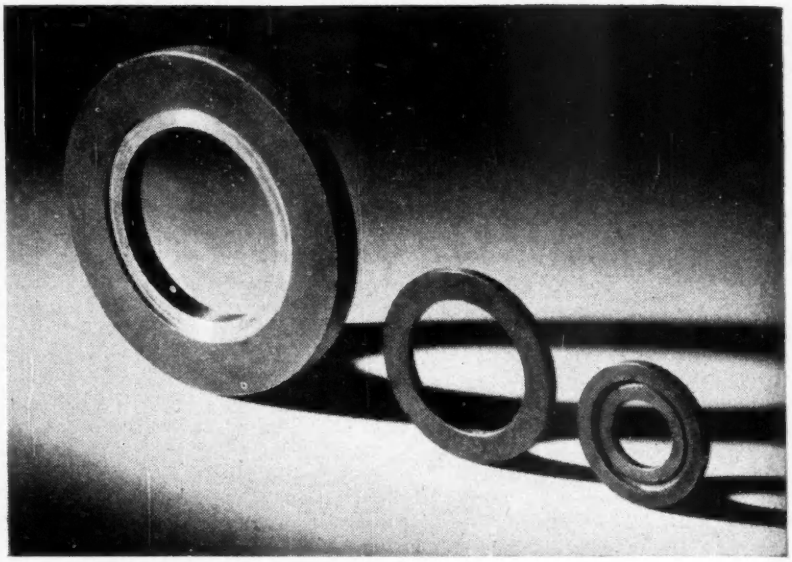

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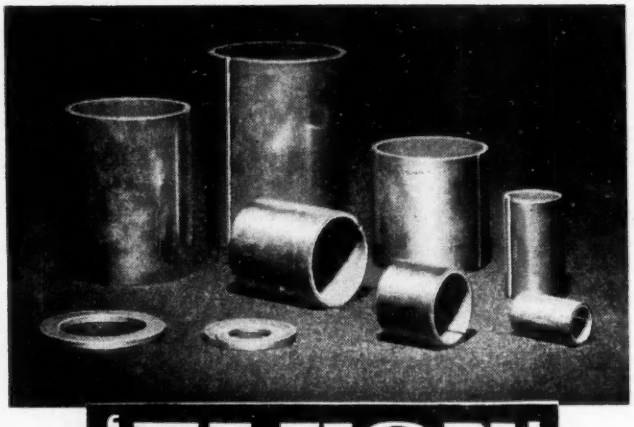

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European Federation

RECENTLY a professor from one of the world's best-known universities, Heidelberg, suggested that a United States of Europe was not only highly desirable but feasible. He believed that a start could be made by sharing scientific knowledge and by working together for the common good in various scientific fields. He suggested that the European Federation of Chemical Engineering might set an example to the world—if only British engineers would co-operate. If members of the profession would forget the past and work together to raise the standard of living of all peoples in Western Europe it would prove an inspiration to politicians as well as to the ordinary man. There was, he said, a great waste of intelligence and energy which could be prevented only by mutual trust and friendliness.

This is obviously a suggestion worth considering, and it is not surprising that many Europeans are quite bewildered by the fact that no British organisation feels that it can support the European Federation. The excuses put forward for a policy of isolation—at least by the Society of Chemical Industry—are not convincing. It is generally believed on the Continent that overpersuasion and bluster by one or two individuals is the sole reason for non-participation. Rightly or wrongly it is being said that one veteran SCI big-wig allowed his personal feelings towards one of the moving spirits of the Federation to blind his judgment. It is being stated in usually well-informed quarters that this individual became so vehement in his attack on the proposal that the SCI join the Federation that he spat on the floor. Here in Britain it is being said that there are many SCI members who would like to support the proposal but who are afraid to do so for fear of starting a first-class row.

During the course of the OEEC conference on the functions and education of the chemical engineer in Europe, which took place recently in London, there arose a suggestion that an international union of chemical engineering should be set up. (See *Chemistry & Industry*, 1955, 365.) There seems to be considerable doubt as to who actually made the suggestion, for we are told that Continental and British delegates are each pointing the accusing finger at one another. This is not the only question which is being asked. Members of the 23 European societies—representing 13 countries—which have already joined the European Federation are asking what the aims and objects of such a union would be. They wonder why such a union should be necessary since the Federation has been in existence for two years. If the Federation does not fill the needs which are felt, why can it not be altered? It was said in *Chemistry & Industry* that only scientific societies should be admitted to membership in the proposed union which appears to be an indirect way of saying that the existing European Federation's membership is not in this category. It was also said that neither of the British bodies concerned felt able to agree to co-operate with the formation of the Federation because it was felt 'that although the idea was good, the pro-

posed organisation was too closely linked with trade organisations'.

The bye-laws of the Federation state clearly that the object of the Federation is the furthering of European co-operation in the field of chemical engineering. Membership is restricted to official technical and scientific societies whose activities are concerned either wholly or partially with the field of chemical engineering. The Federation is managed by a Board consisting of the chairman or other nominated representatives of the member societies. This Board elects a chairman for each meeting, preferably from the delegates of the country in which the meeting takes place. Executive action is delegated by the Board to a standing committee of not less than four or more than six members elected by the Board, and the members of this executive committee must be representative of various countries. Members of the Board of Managementment and the Executive act entirely in an honorary capacity. A general secretariat is provided for with two offices—the one being provided by the Société de Chimie Industrielle in Paris and the other by the DECHEMA in Frankfurt. The administrative expenses of the secretariat are borne by the two societies who have undertaken to provide these facilities. Provision is made for the creation of additional offices in other countries as necessary.

It is difficult to see where the alleged close link with trade organisations lies. Certainly no such suggestion has ever been made outside of certain circles in this country. It is true that both DECHEMA and the Société de Chimie Industrielle have been associated with certain exhibitions, but the American Chemical Society holds a chemical exposition in Chicago and we have not yet heard the SCI accuse it of being a trade organisation. The declared aim of the DECHEMA is to further the development and advancement of chemical apparatus and equipment, chemical engineering and process techniques, on a mutual benefit basis. This has not changed since the inception of DECHEMA in 1926 as a reorganisation of the chemical plant section of the Verein Deutscher Chemiker. The fact that the DECHEMA admits to membership not only scientists but also chemical companies, chemical plant manufacturers, institutions and local authorities merely enables it to perform its functions of fostering co-operation more efficiently. And, for that matter, does the SCI claim that its members are all scientists or that the majority of members pay their own subscriptions? Among the services which DECHEMA offers its members are six different classes of information service, the arranging of scientific meetings and discussion groups, the publication of two purely technical journals and a series of monographs, the compilation of the world-famous 'Werkstoff-Tabelle' and the publication of the ACHEMA Yearbook. Is the latter much different, except in size and elegance, from the 'Buyers' Guide' of *Chemistry & Industry*? And, in any case, what is wrong with trade organisations? Where would this country be without its many trade organisations or if the technical or scientific man refused to co-operate fully with them? Since when has it been a British trait to turn up your nose at commerce?

It is being said in Europe that Britain will not join the European Federation for Chemical Engineering because a few people do not want to play the part of a 'small frog in a large pond'. It is said that personal jealousies have influenced some people. We find this hard to believe, however, and sincerely hope that the SCI Council will put the full facts before members and the whole world before very long. Considerable grumbling has been going on recently among the general body of members concerning 'the old guard'. It is said that new blood is needed to halt the stagnation that has set in and that some of these who have served the Society for many years should make way for those with more progressive ideas. The SCI is an admirable body and one with a world-wide reputation. Its official journal is one of the finest scientific publications in the entire world. It seems a pity that there should be even the slightest suspicion that either was being used for the selfish ends, or personal ambitions, of a small group of individuals.

Notes & Comments

Commonwealth Fertilisers

WE are frequently reminded of the threefold increase in British fertiliser use since the war, but the not dissimilar trends in the rest of the Commonwealth are less well publicised. However, the statistical picture has been tidily presented in a new documentary publication by the Commonwealth Economic Committee, ('Commonwealth Agriculture', 1955, 44 pages, from HMSO, 2s. 6d. net). Canada's increase is relatively greater than Britain's—for every ton of fertiliser used in 1938, Canada was using four in 1953; broken down for specific plant nutrients, this total fourfold increase is composed of an almost eightfold rise for nitrogen and threefold rises for phosphate and potash. There still seems plenty of room for further Canadian expansion; her nitrogen usage still seems proportionately low compared with her phosphate and potash usage. Australia's increase is small, about 35 per cent; nor is New Zealand's increase large at about 60 per cent. However, both these countries traditionally follow the superphosphate path, relying mainly upon clovers for natural nitrogen; even so, it is surprising to find that the annual consumption of phosphate and potash has not risen more.

Room For Increases

SOUTH AFRICA'S total usage has increased since 1938 by rather more than 200 per cent, including a sixfold jump in nitrogen consumption. Ceylon's fertiliser consumption, mainly of nitrogen, has increased nearly 2½ times. The comparative picture for India and Pakistan is complicated by the post-war division of the sub-continent, but bringing post-war figures for India and Pakistan together, the increase since 1938 is remarkable—for each ton used then nearly seven tons are used today. Most of this increase is for nitrogenous fertilisers and most of it, too, seems to have occurred in India; but in the last two or three years Pakistan has been following the Indian pattern, e.g., her use of nitrogenous fertilisers in 1953 was 2½ times that of 1952, an extraordinarily big change in a single year. The over-all Commonwealth picture is fairly satisfying. There is still enormous room for increases in consumption, but neither home production nor imports can be stepped up at high rates. The expansion that has taken place seems likely to continue steadily in most countries, and it is already impressive enough to show the rest of the world that the Commonwealth is not lagging behind in its contribution to increased world food production.

A Chemical versus Smoke

THE oil-fired lamp or stove that converts itself into a carbon black production unit must be listed among the worst of domestic life's irritants. The design of modern oil-using appliances has greatly improved, of course, and the chance of sudden shortages of air or excesses of fuel is far smaller today; even so, these carbonaceous accidents still happen. In the fuel oil burning furnace, even the smallest degree of incomplete combustion steadily builds a deposit of carbon on heat transfer surfaces. This leads to lower fuel efficiency, especially when the demand for heat calls for peak rates of oil combustion. A chemical additive that acts as an anti-smoke agent has recently been developed by Du Pont research. Called DCPI for ease, its authentic name is dicyclopentadienyl iron, and is said to be the first organic compound of iron with only carbon and hydrogen to be synthesised. Additions of from 0.1 to 0.05 per cent by weight have minimised smoke formation in both low pressure and high pressure oil-burning systems. Fuel/air ratios could be raised by 10 or 20 per cent above normal non-smoking levels. The 0.05 per cent addition of DCPI reduced carbon deposits on furnace walls, etc., by as much as 75 per cent. The potentialities of this new chemical development may not be limited to present fuel use conditions. The

addition of DCPI to heavy oils now regarded as unsuitable for combustion may bring enough improvement to make them useable. A short account of DCPI can be found in *Industrial & Engineering Chemistry* (1955, **47**, [5], 13A); the full paper was read at the recent ACS Cincinnati meeting to the Division of Petroleum Chemistry.

Prospects for Plastics

FORMER post-war exhibitions staged by the British plastics industry have been held at periods of recession or market-change. The exhibition this June in London was the first to coincide with a period of vigorous expansion, but it also coincided with the rail strike. For this latter reason of random misfortune the exhibition perhaps lost a useful proportion of its otherwise expected value. However, it is not the detailed progress of this or that polymer that is dominantly impressive; rather, it is the general progress of the whole industry.

Outlook Mainly Fine

OUTPUT is twice what it was in 1948. It is 10 times the 1938 figure, but in an industry of so much technical change the pre-war/post-war comparison is not particularly instructive. Quite as important as increased output is the fact that many selling prices have been falling during a period of rising production costs—process improvements, productivity technique, and the general effect of greater throughput have enabled the industry to achieve this. The industry spends heavily on research and development. The amount has been estimated in *The Economist* (1955, 4 June, 878) at as much as 7 per cent of its turnover. The only flaw in a glittering picture of continued progress is the subconscious fear of the industry itself, a fear that its market is liable to change abruptly. It is a fear with some past basis for justification. Nearly a third of the total output of 'raw' plastics is exported, and how much is also exported as component 'parts' of manufactured articles is quite unknown. Probably *in toto* a good deal more than half the British output of plastics is sold abroad. Import restrictions imposed by other countries can seriously constrict the flow of this trade. Nor is the home market free from sudden changes, for tighter regulations for hire purchase terms affect the demand for domestic goods in which plastics are so much used. However, ever-widening uses of plastics and the present trend for most established uses to be increased can be cheerfully set against this cautious view of the future. The industry has its eggs in a diversity of baskets and it is surely unlikely that a significant number of them will face trouble at the same time. An older cause for nervousness—the bad name that shoddy plastics goods earned the industry immediately after the war—has been considerably wiped out. Better products with standard specifications have regained public respect.

Plastics Exhibition Notable Success

In spite of the railway strike, attendance at the British Plastics Exhibition which ended last Saturday at Olympia, London, was higher than that for the previous exhibition in 1953. Visitors from 50 countries attended the event, and manufacturers of plant reported good business. Mr. Arthur Skan, chairman of the British Plastics Federation, apologised to more than 30 firms who were unable to obtain stand space at the exhibition.

Raw Butyl Rubber

The Treasury have made the Import Duties (Exemptions) No. 4 Order, 1955, which exempts raw butyl rubber, for a limited period ending 31 December, 1955, from the general *ad valorem* duty of 10 per cent chargeable under the Import Duties Act, 1932. The order came into operation on 8 June, and has been published as Statutory Instruments 1955, No. 802.

Annual Holiday

The works and offices of Glass Developments Ltd. will be closed for the annual holiday from 5 p.m. Friday, 22 July, until 8 a.m. Tuesday, 9 August. No goods can be accepted or deliveries made during this period.

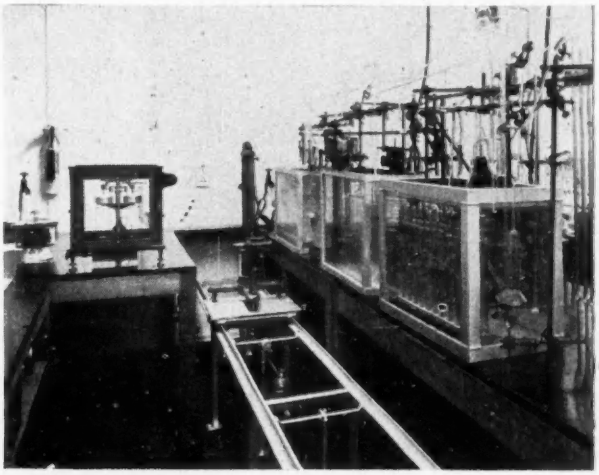
BCURA on Show

An Important Research Association

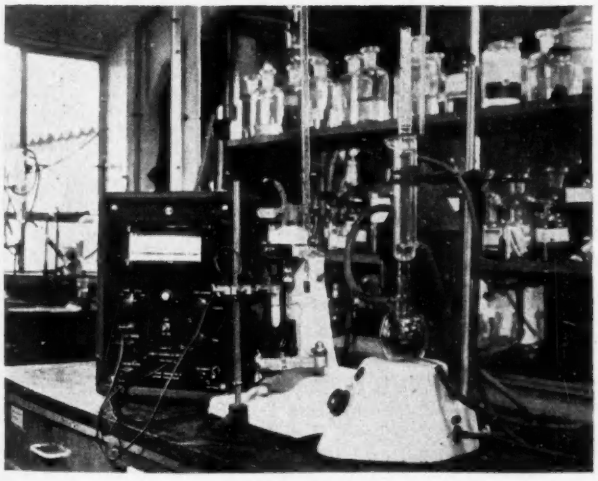
'IT is a great source of satisfaction to me and my colleagues . . . to witness the mounting record of scientific and technological achievement which now stands to the credit of the research associations and adds to their reputation throughout British industry'. These words were contained in a 1955 message to the research associations, which now number 41, from Sir Ben Lockspeiser, permanent secretary to DSIR.

One of the largest of these associations is BCURA (British Coal Utilisation Research Association), which since its formation has grown rapidly, having in 1938 an annual income of £28,000 which has risen till to-day it exceeds £300,000. It now has a staff of 300 of which 80 are graduates and a similar number research assistants, and its work extends over many fields of science; mathematics, physics, chemistry, together with full-scale engineering.

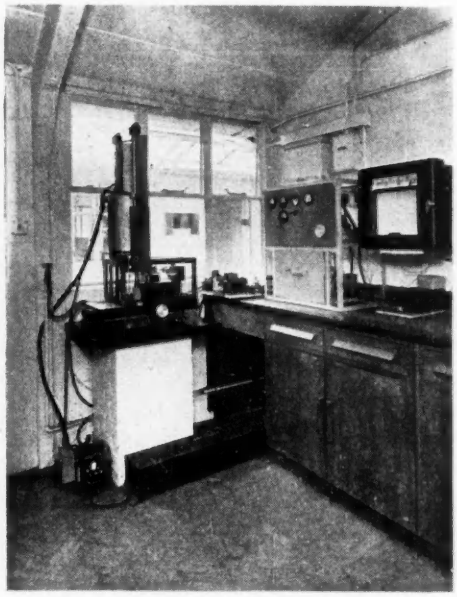
The association has the support of the National Coal Board, the Central Electricity Authority, the Gas Council and the British



The gravimetric adsorption apparatus in the constant temperature room of the chemistry department at the BCURA laboratories



Apparatus used for determining oxygen as hydroxyl in coals



The laboratories' thermobalance

Transport Commission, as well as about 150 other members—individual firms and various trade associations. The association thus occupies a focal position in fuel utilisation and research.

The press review on 7 June, the actual open days on 8, 9 and 10 June, together with various publications, such as 'The Annual Report 1954' and the quarterly *Gazette* enable a fairly complete picture of the association's activities to be obtained.

We have already described some of the work being done by BCURA on the constitution of coal (see THE CHEMICAL AGE, 1955, **72**, 1253) and it is only necessary to say here that these investigations may help to throw some light on the behaviour of coal during combustion and carbonisation as well as indicating the potentialities of the different fractions for the production of saleable organic chemicals.

British coals contain sulphur in amounts varying from 0.5 to three per cent and during combustion this is converted to sulphur dioxide together with a small amount of sulphur trioxide. By reaction with alkalis evolved during the combustion process and with water vapour, deposits and acid condensates are formed, causing fouling and corrosion of the appliance and finally necessitating the renewal of structural components.

Chlorine is also contained in British coals in amounts ranging from 0.1 to one per cent. The chlorine content of deposits when analysed is usually negligible, chlorides probably being converted into sulphates either in the gas phase or after deposition.

Corrosion of air heaters and other low temperature surfaces is generally recognised as being due to the direct condensation of sulphuric acid when the temperature of the metal surface falls below the sulphuric acid dewpoint. Very small amounts of sulphuric acid in the flue gases, of the order of 0.005 per cent by volume, can cause condensation at temperatures of 150° C and upwards.

Control of the formation of sulphur trioxide appears to be the most attractive solution to the problems of deposits and corrosion. Powdered dolomite ($CaCO_3$. $MgCO_3$) was added to the flue gases in a travelling grate-fired boiler and the results compared with a similar boiler acting as a control unit. It was found, contrary to American experience with oil fired boilers, that there were no significant differences in the condition of the economiser tubes or the acidity of the flue gases.

It has been clearly shown that a decrease in the sulphur/chlorine ratio of the fuel and an increase in the carbon and grit burden of the flue gases reduce the amount of sulphuric acid available for condensation.

The recent report of the Beaver committee has focused attention on the question of flue gas washing. The committee recommends that power station flue gases should be washed in such a way as to remove 90 per cent of the oxides of sulphur. However, wet washing does not effectively remove sulphur trioxide, and this, combined with attendant cooling and loss of buoyancy of the gas might well increase local deposition of acid mist.

Inquiry Called For

Middlesbrough Corporation Sanitary and Baths Committee is recommending that a Ministry inquiry should be held into a nuisance caused by fumes from the local chemical works of Sadler & Co. The matter has been under consideration for some time. The local Medical Officer of Health alleged that the fumes were responsible for his own attack of bronchitis.

Analysis of Textiles

General Survey of Methods—Part II

SCOURING does not remove the natural colouring matter of cotton and to produce an acceptably white cloth bleaching agents must be used. These are normally oxidising agents—hypochlorites or hydrogen peroxide—used in slightly alkaline solution. The operation is perhaps the most potentially dangerous in the whole textile finishing, but the method of conducting it permits of little chemical control other than those exercised by time, temperature, and reaction (*p*H) of the bleach liqour. It is important, however, that the quality of the finished product should be examined to ensure that the process is, in fact, under control.

Celiulose is a natural polymer consisting of anhydroglucose units joined by glucoside linkages, and this structure may be attacked by oxidising agents in many ways. By far the most important from a textile point of view is attack that results in cleavage of the chain molecules, as the textile strength is closely related to the degree of polymerisation. To-day the measurement of the viscosity of a solution of a polymer in a suitable solvent is commonplace as a means of assessing the degree of polymerisation, but this method was evolved empirically for the examination of cellulosic textiles as long ago as 1924 (**14**) and reached its present form in 1936 (**15**).

Equipment Simple

From the start it was intended that this method should serve for both works control and research purposes, and the equipment used is kept as simple as possible. The viscometer is a plain tube about 20 cm. by 1 cm. fused to a capillary outlet about 2.5 cm. by 0.1 cm. The cotton is dissolved, in the viscometer itself, in a solution of cuprammonium hydroxide, and the viscosity is measured by supporting the viscometer vertically, with free outflow through the capillary, and measuring the time taken for the level in the main tube to fall from one fixed mark to another.

A complication of the method is that air can cause rapid degradation of the cellulose dissolved in cuprammonium solution, while stirring of the solution is essential to disperse the cellulose. Normally the viscometer is filled completely with cuprammonium hydroxide solution and stirring effected by including a pellet of mercury and rotating the viscometer end over end. This is rather a slow process, and for works use the inclusion of antioxidants such as pyrogallol (**16**) in the solution has been proposed, solution then being effected by shaking in air.

Expressed in Poises

It has been found convenient to express the results in terms of the reciprocal of viscosity (in poises) known as the fluidity. The cuprammonium hydroxide solution itself then has a fluidity of 72 and 0.5 per cent cotton solutions range from two to 40, at which value the fibre has lost about 80 per cent of its strength. Viscose rayon is unavoidably degraded in manufacture and a 2 per cent solution is normally used, when the range of fluidity is very similar to that for a 0.5 per cent solution of cotton.

Apart from its important chain cleaving effect, over-oxidation in the bleaching process may result in attack of the primary and secondary alcohol groups in the glucose residue forming aldehyde and carboxylic groups in varying amounts. For the agents used in bleaching it has been established that acidity of the bleaching liquor favours the formation of aldehyde groups, and alkalinity of carboxylic groups. The determination of these groups in a damaged cloth may therefore provide information as to the conditions under which the damage occurred.

Aldehyde groups are estimated by boiling the cloth with an alkaline copper bicarbonate solution and determining the amount of copper reduced to the cuprous state by 100 g. of cloth (copper number). The method is empirical, but the conditions are so chosen that reproducible results are obtained, and the result for undamaged cellulose is small (**17**). For damaged material copper numbers up to eight may be obtained. An important effect of the presence of aldehyde groups is that the cloth becomes proportionately more likely to discolour on heating, and, where the cloth is to be vulcanised, it is usual to ensure that the copper number does not exceed 0.2.

Carboxyl groups have been determined by a variety of methods based on the fact that the oxidised cellulose behaves as a weak acid ion exchanger. The most convenient methods are based on exchange with the methylene blue cation in suitably buffered solution, the absorption of the methylene blue, which under suitable conditions is practically quantitative (**18**), being determined colorimetrically.

Alkalinity Must Be Maintained

Where the fluidity of a cloth shows that over-bleaching has occurred, it is usual to find that the damage has been caused by failure to maintain the bleach liquor in a slightly alkaline condition. With hypochlorite liquors the activity increases greatly as the *p*H falls, and at *p*H 7, rapid formation of aldehyde groups occurs in the cellulose, and the cloth acquires a high copper number. The methylene blue absorption remains low during this type of attack, but it is of little diagnostic value as the absorption shown by normal cottons are somewhat variable. This variability renders it difficult to detect with certainty the alternative form of attack caused by excessive oxidation under alkaline conditions, which should result in material with a high methylene blue absorption but low copper number. A control sample is essential and this is rarely available except in the case of a cloth that has suffered localised over-bleaching. The low copper number is an unreliable criterion if the previous history of the cloth is unknown, since an alkaline treatment after bleaching may reduce a high copper number practically to zero without affecting the methylene blue absorption.

A high copper number, or even a high methylene blue absorption may also be obtained as a result of an entirely different form of attack on the cellulose. It is the practice, after alkaline treatments, to wash the cloth with dilute acid as free alkali is difficult to rinse out. If the treatment with acid is excessive, pure hydrolysis of the glucoside links in the cellulose will occur, and, as each link broken regenerates one aldehyde group, material with high copper number and low fluidity may result. Again if the acid is not thoroughly rinsed from the cloth before drying such attack may be caused during the drying process, with the additional complication that, if the acid is sulphuric, it may combine with the cellulose to give a half-ester. This will result in material with a high methylene blue absorption but which may be distinguished from oxidised cellulose by the fact that, being a strong acid ion exchanger, its absorption of methylene blue is maintained even in dilute acetic acid solution, in which the absorption by carboxyl groups is small.

Scouring and bleaching may be regarded as fundamental treatments which produce a cloth acceptable to the purchaser in its own right, or provide a suitable groundwork for subsequent processes. These processes consist of essentially mercerising, dyeing and printing, and the application of various finishes.

Mercerisation is effected by treatment of the cloth with a swelling agent in the form of 30 per cent sodium hydroxide solution. The changes occurring are largely physical, producing the well known lustrous appearance, and the result achieved cannot be measured by chemical methods. The detection of uneven mercerisation is, however, of some importance and chemical methods have been proposed for the comparison of the degree of mercerisation in different areas. The methods depend upon the measurement of the general reactivity of the cellulose, which is increased by the swelling, and methods involving the selective adsorption of hydroxyl ions from dilute aqueous solution, and the rate of reaction with oxidising agents have been used (**19**). There is, however, no clear relationship between the degree of swelling and the final lustre, and the results are of doubtful utility.

Examination of Dyed Cloth

The analytical chemistry of dyeing and printing is of course considerable in its own right, but for the present purpose only the examination of dyed cloth will be considered. The principle means of separating dye and fibre is by means of a suitable solvent that will dissolve dye, fibre, or both (**20**) the dye being then determined colorimetrically either in the resulting solution or after transfer to a more convenient solvent. A common solvent for dissolving both dye and cellulosic fibre is 80 per cent sulphuric acid. If the analysis is to be a qualitative one the extracted dye may be examined by a variety of methods. A very extensive scheme involving partition into various solvents has been published (**21**).

Increasing use is being made of colour-

less dyes such as fluorescent bleaching agents, and cellulose substantive dye fixing agents and waterproofing agents to which of course the colorimetric method cannot be applied. The determination of these represents an interesting, and as yet unexplored, field.

Again the dyestuff may in fact be a pigment, either dispersed in the cloth or bonded with a suitable resin. Here the possibilities are so varied that each case must be considered on its merits. Notable in this class are mineral khakis obtained by the deposition in the cloth of hydrated chromium and iron oxides with or without the addition of copper, and, occasionally, manganese oxides.

In addition to this form of 'dyeing,' inorganic materials are applied to cellulosic textiles in surprising variety and their determination is of considerable interest. Titanium dioxide, calcium carbonate, zinc oxide and lead chromate are used as pigments, borates, phosphates, titanium and antimony compounds as flameproofing agents, calcium, magnesium and sodium sulphates as weighting agents, copper and zinc compounds as rot proofing agents, besides many other metals in relatively small amounts as mordants, dye stabilisers, oil dryers, etc. Except in isolated cases the additions do not generally exceed a total of 10 per cent. Methods for determining these metals must therefore depend upon rapid and efficient destruction of organic matter and a method involving the use of nitric and perchloric acids has proved wholly satisfactory over a number of years (**22**).

Unusual Combinations of Metals

The search for a satisfactory method of concluding the analysis is, however, frequently complicated by the unusual combinations of metals which may be present at the same time and which may need to be determined—or not determined—as the case may be. The methods are required to be simple, rapid, and accurate, and separations have therefore to be kept at a minimum so that an unorthodox approach is frequently necessary.

If the determination of inorganic additions to textiles is difficult, the problem of the analysis of organic finishes is much more so. Until not very long ago such finishes were limited to starch and starch products, drying oils, waxes, gelatin and casein. With the advent of polymeric materials suitable for application to textiles, however, the number of possibilities has increased greatly and the present tentative scheme in use at the Shirley Institute covers some 30 types of polymers, nearly all of which have been encountered in commercial samples.

Group Classification

The sample is successively extracted with a number of organic solvents and the finish placed in one of seven groups according to its solubility in a particular solvent or general insolubility in all solvents. Subsidiary separations are then made within the groups as far as possible by chemical methods—elements tests, saponification, thermal depolymerisation, acid hydrolysis, destructive oxidation—together with tests for specific characteristic products of the attack all yield useful information. Dyeing tests, though widely published, are regarded as unreliable and are avoided wherever possible in favour of chemical tests. For instance, it is often suggested that aminoformaldehyde finishes may be detected by dyeing the sample with disulphine blue V which is stated to dye the resin, but not the cellulose substrate. Positive results are indeed given with aminoformaldehyde resins, but also with various protein finishes, with fluorescent bleaching agents, cationic softening agents and dye fixatives, and even with wood flour which may be used as a filler. For the same reason short cut schemes employing such tests as solubilities in various solvents and smell on ignition are regarded with suspicion. The use of mixtures of plastics is greatly increasing and it is obvious that anything but a systematic scheme leaves great possibilities for error.

Unfortunately little is known of the analytical chemistry of polymers and on account of possible variations in molecular weight or structure, the properties for one product may little resemble those of another stated to be chemically similar. Considerable attention has been and is being paid in Germany to analytical properties of polymers, but so far the schemes published have involved reactions too involved for ready use on a works scale.

Not a small part of the analytical chemistry of textiles involves the examination of faulty material. The faults vary from uneven processing to contamination, either general or localised, with a remarkable range

of materials from metals or metallic compounds to tea. In many cases the contaminant is invisible and manifests itself for example, only by changing the shade of a dyeing or by initiating chemical attack of the cellulose in its vicinity. The identification of these adventitious contaminations calls for micro methods and frequently for considerable microscopical ability. The methods employed are normally micro adaptations of methods already mentioned; in particular the fluidity may be determined on a micro scale by much the same technique, but by employing a small rolling sphere viscometer.

Loss in Fibre Strength

Another fault frequently encountered is a general loss in strength of the whole fabric. Here the trouble may be due to the catalytic activity of trace metals in accelerating or inducing oxidation of the cellulose. Copper and manganese in oil and rubber coated fabrics, and iron in sulphur black dyed materials, are particularly active in this respect at concentrations well below 0.01 per cent. Hydrolysis of inorganic additions such as ammonium sulphate may cause a similar effect by acid attack or the trouble may arise entirely from atmospheric sources. A final and fortunately easily distinguished cause is microbiological attack. This is differentiated by the fact that the fibres are mechanically weakened by ingestion of parts of their substance by the micro-organisms, and hence an abnormally weak cloth with an unimpaired fluidity is indicative of this type of attack. It is frequently difficult to detect the organisms microscopically.

In this report it has been possible to deal only very briefly with but a portion of the wide field which may be covered by the title 'The Analytical Chemistry of Textiles'. The final result in fact resembles a textile product itself in being composed of intersecting threads with a good measure of spaces in between, but it will perhaps have served to show that even in an industry almost as old as man, there are still questions to which the analyst must provide the answer.

Following his comprehensive account of the analytical chemistry of textiles, the meeting was opened for a short while for questions to be put to Mr. Hamlin. When asked if methods involving variation of capacitance had been tried for the determination of the moisture content of textiles, the lecturer replied that although such methods had been considered at one time at the Shirley Institute, alternative procedures were eventually employed. One questioner said that soaps had been mentioned as antistatic agents in weaving, and he wondered whether much use of radioactive materials had been made in this connection. Mr. Hamlin thought that the difficulty here usually lay in the size of the mill apparatus which would need to be exposed to radiation, so that the mill workers themselves would be subject to some danger. In cases of small mill apparatus, however, radioactive materials were being employed overnight as antistatic agents.

REFERENCES

(14) Farrow, F. D., and Neale, S. M., *J. Text. Inst.*, 1924, **15**, T157.
(15) Clibbens, D. A., and Little, A. H., *J. Text. Inst.*, 1936, **27**, T285.
(16) Howlett, F., and Belward, D., *J. Text. Inst.*, 1949, **40**, T339.
(17) Clibbens, D. A., and Geake, A., *J. Text. Inst.*, 1924, **15**, T27.
(18) Davidson, G. F., *J. Text. Inst.*, 1948, **39**, T65.
(19) Neale, S. M., *J. Text. Inst.*, 1931, **22**, T320, 349.
(20) Giles, C. H., and Shaw, I. S., *J. Soc. Dyers & Col.*, 1953, **69**, 481.
(21) Matthewson, *Amer. Dyes. Reptr.*, 1948, **37**, 709.
(22) Hamlin, A. G., *J. Text. Inst.*, 1949, **40**, T343.

Filler LS

A NEW product, named Filler LS, has been introduced to the leather industry by Norman Evans and Rais Ltd., of Manchester. It is an improved form of Suedefix, the American product which was used in great quantities in the leather trade before the war.

Filler LS is principally designed for use in the finishing of suedes, and can be used as a binder in pigment finishes. Its function is to fill and tighten the nap—either by spraying or padding, or by an acid topping process. It is compatible with the casein type pigment film finishes and gives an efficient plasticisation to the pigment film. It has been found that the finish obtained after formaldehyde fixing is less brittle than when ordinary casein is used.

The firm recently introduced Nercobate A, a synthetic bate designed for use with all types of leather, which is economical owing to its high enzymic activity. The principal active constituent is of pancreatic origin which is standardised to a definite strength with wood flour. Ammonium salts, used in small amounts, act as a de-liming agent.

Teething Troubles Over?

Canadian Chemical Co. Optimistic

A NEW air of optimism is pervading top management of Canada's biggest post-war chemical project—Canadian Chemical Co., Edmonton. Many of the teething problems connected with bringing the $75,000,000 petro-chemical operation to Canada now appear about over. Although marketing problems still remain, there is a growing feeling that a steadily brightening picture will now be shown.

Currently sales are running at a record level. The chemical section of the plant is operating at close to 100 per cent capacity and output of cellulose acetate is considerably over plant-designed capacity.

Entrance of the company last year into the export picture helped boost Canadian shipments of cellulose products from slightly under $1,000,000 to $8,700,000. The rate is considerably higher again this year with total Canadian exports of $3,568,000 up to the end of March ($705,000 in the same period last year).

Production of five more industrial chemicals is scheduled to begin at the Edmonton plant by midsummer. A recent market survey has outlined two new groups of products which the company could successfully process at Edmonton. They would involve further plant additions.

The economics of the Edmonton plant depend substantially on maintaining operations at a high rate of designed capacity. Company officials frankly admit that to get up to this level has meant disposing of certain products at unattractive price levels.

Success at ACHEMA

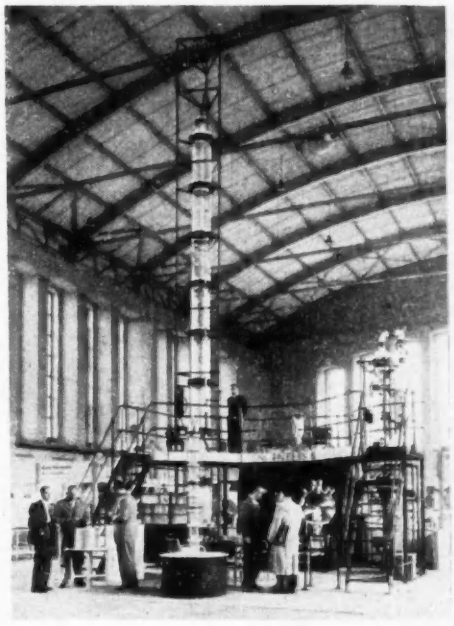
British Glass Firm Praised

THE exhibit of a British glass pipeline and chemical plant firm at the recent ACHEMA exhibition was described by the managing director of a rival firm as the most outstanding glass exhibit he had ever seen, according to Mr. J. G. Window, sales director of Q.V.F. Ltd.

Centre piece of the stand was a 40-ft. flanged glass tower 18 in. in diameter. Largest example of this type of tower in the world, it stood above every other stand at the exhibition. Competitors from other countries were unable to present anything comparable, the largest tower they exhibited being of 12-in. diameter.

The stand was visited by representatives from nearly every country in the world, with the possible exception of Russia. The firm's agents from the US, Canada, Holland, Belgium, Switzerland, France, Portugal, Italy and the Scandinavian countries, all worked on the stand during the exhibition.

Mr. Brian H. Turpin, managing director, commenting on the great number of inquiries which the Q.V.F. stand received, said: 'If more British firms had the courage to back up their belief in the quality of their goods by taking their products into the enemy's camp as we have done, they would have an easier task in convincing overseas markets that our technical skill and quality of production are second to none. Only 12 exhibitors out of 850 at ACHEMA were British.'



The Q.V.F. stand at Frankfurt with the 40 ft. glass flanged tower on the left

Q.V.F. Ltd. had the largest British stand at the exhibition and took with them apparatus for providing their own steam, vacuum and air supplies. All exhibits on the stand were shown working. Q.V.F. Ltd. were able to offer delivery in a third of the time that their competitors could undertake.

Albright & Wilson Ltd.

New Factories Completed

LAST year was a satisfactory one for Albright & Wilson Ltd. Turnover in each country the company operates in increased, and three new manufacturing units were completed during the year and are now working.

The most outstanding development was the completion of new factories at Portishead and Kirkby for the production of phosphorus and tripolyphosphate. The expansion of gross profit was partially offset by substantial depreciation charges which rose by £606,000 to £1,276,000. This was due to heavy capital outlays, not only at home, but also in Canada and the US.

Net Profit Increased

The net profit after deducting tax and the minority interest in subsidiary companies increased by £153,000 over the previous year's total of £710,000. The total ordinary dividends for 1954 amounted to 22½ per cent as against 17½ per cent for 1953. The distribution remains at somewhat less than one-third of the net earnings after providing for the preference dividend.

At an extraordinary general meeting resolutions were passed effecting the bonus issue of one ordinary share of 5s. for every two ordinary stock units of 5s. held.

During the year a new agreement was made with Dow Corning Corp., and as a result the plant at Barry, South Wales, has been transferred to Midland Silicones Ltd., which now makes as well as distributes silicones. The shares of the reorganised Midland Silicones Ltd. are held as to 60 per cent by Albright & Wilson Ltd. and 40 per cent by Dow Corning Corp.

Among overseas companies, sodium chlorate manufacture began in July at the Oldbury Electric-Chemical Co.'s new site at Columbus, Mississippi. In Canada the market for phosphates and chlorates has supported a satisfactory increase in turnover of the Electric Reduction Co. of Canada, and a new phosphorus plant was installed at Varennes.

In Australia Albright & Wilson (Australia) Ltd., a company jointly owned with I.C.I. of Australia & New Zealand, was granted its own sales organisation; previously undertaken by ICIANZ.

Harwell Advice Group

Radioactive Materials for Industry

ON Tuesday morning at the Society of Visiting Scientists, 5 Old Burlington Street, London, Dr. Henry Seligman, chief of the Isotope Division at Harwell, announced at a press conference that a research and advice group to aid industry had been formed at Harwell.

To be known as The Technological Irradiation Group, it will enable industry to take advantage of new atomic developments, and will develop uses for the powerful new fission products called 'waste products of atomic piles,' which are becoming available.

This expansion at the research establishment is a result of stocks of fission products accumulating, and radiations equivalent to hundreds of tons of radium will be available in a short time. Besides fission products the group will make use of Van de Graaf machines and strong sources of radioactive isotopes to be produced in new reactors now being built at Harwell.

Asked if the US had much of a lead over this country in adapting atomic research to industry, Dr. Seligman said: 'The Americans had about a two-year start, but I think we are a little ahead as regards its use in plastics'.

Dr. Seligman said that the approximate cost of the project might be in the region of £400,000 in the first year, but it was difficult to estimate the whole cost yet. A staff was being formed, and later the group would move into new quarters somewhere near Harwell.

Sterilisation Problems

Dr. Robert Roberts talked about sterilising foodstuffs by radiation, which the US is now doing to some extent. In fact Harwell had supplied the Royal Navy with irradiated onions and potatoes for submarine crews. Saying that irradiated steak tastes slightly cooked, and that milk treated by the Americans was tasteless, Dr. Roberts said that two years' research would overcome this.

The Technological Group consists of three sections; chemical, biochemical, and physical, and it is planned to give courses of study for industrialists and students. Dr. Roberts, a physical chemist, who has been with the Atomic Energy Authority for three-and-a-half years, will head the chemical section.

The Queen's Birthday Honours

Sir Geoffrey Heyworth Created a Baron

AMONG the four new barons announced in the Queen's Birthday Honours list on 9 June was SIR GEOFFREY HEYWORTH, chairman of Unilever Ltd. This high honour is significant of the recognition that the chemical industry and allied activities received in this year's Birthday Honours. Sir Geoffrey Heyworth joined Lever Brothers at Liverpool in 1912 and held various positions in this country and in Canada until 1931 when he became a director of the parent company, Lever Bros. Ltd. (now Unilever Ltd.). In 1945 he became chairman of the Gas Industry Committee, and last year a member of the University Grants Committee and chairman of the United Africa Co.

MR. HUGH EDMUND WATTS, C.B., M.B.E., G.M., B.Sc. (London), Ph.D. (Zurich), H.M. Chief Inspector of Explosives, received a knighthood. MR. FRANK CYRIL MUSGRAVE, C.B., Permanent Secretary, Ministry of Supply, was created a Knight Commander of the Order of the Bath. Other honours awarded are as follows:—

Companion of the Order of the Bath

MR. NORMAN C. WRIGHT, M.A., D.Sc., Ph.D., Chief Scientific Adviser, Ministry of Agriculture, Fisheries & Food.

Knight Commander of the Order of the British Empire

DR. ALEXANDER FLECK, D.Sc., LL.D., F.R.I.C., chairman of Imperial Chemical Industries Ltd.; director, Imperial Chemical Industries (South Africa) Ltd.; Cape Explosive Works Ltd.

Commanders of the Order of the British Empire

DR. ARNOLD BLATCHFORD DAVID CASSIE, M.A., Ph.D., D.Sc., F.Inst.P., Director of Research, Wool Industries Research Association; MR. ALBERT EDWARD CHILDS, M.A., B.Sc., Director of Chemical Defence Research & Development, Ministry of Supply; MR. GUY CHIPPERFIELD, chairman of British Oil & Cake Mills Ltd.; MR. JOHN VERNON DUNWORTH, Head of Reactor Physics Division, Atomic Energy Research Establishment, Harwell; DR. GEOFFREY EDWIN FOXWELL, D.Sc., F.Inst.P., F.Inst.F., M.I.Chem.E., director Clayton, Son & Co., past chairman British Chemical Plant Manufacturers' Association, past president Institute of Fuel, consulting fuel technologist; MR. DAVID DOIG PRATT, O.B.E., Director Chemical Research Laboratory, Department of Scientific & Industrial Research, Teddington.

Officers of the Order of the British Empire

MR. S. B. HAMILTON, Principal Scientific Officer, Building Research Station, Department of Scientific & Industrial Research; MR. F. C. V. HOLMES, B.Sc., Chief Chemist, Cunard Group of Shipping Companies; MR. JOHN ASPEY HOUGH, Research Officer, Co-operative Union Ltd.; MR. JOHN CAMPBELL MACDONALD, Chief Technical Officer, British Sugar Corp.; MR. RICHARD ARTHUR PHILIP MORGAN, superintendent, R.A.O.C. Factory, Birtley, Co. Durham; MR. ELWYN ROBERTS, Senior Principal Scientific Officer, Explosives Research & Development Establishment, Ministry of Supply; MR. L. E. A. ROWSON, Deputy Director, Unit of Reproductive Physiology & Biochemistry, Agricultural Research Council, Cambridge.

Members of the Order of the British Empire

MR. F. W. BIRD, laboratory manager, Fullers Earth Union; MR. REGINALD C. COMERFORD, Assistant (Scientific), Ministry of Agriculture, Fisheries & Food; MR. H. P. HALE, Senior Experimental Officer, Low Temperature Research Station, Department of Scientific & Industrial Research; MR. THOMAS CRAIG HAMILTON, labour officer, I.C.I. Ltd., Stevenston, Ayr; MR. WALTER JONES, late assistant manager, Plate Glassmaking Department, Pilkington Bros. Ltd.; MR. RICHARD WALTER LEWIS, chief Chemist, Burndept Ltd., Dundee; MR. W. H. WEBB, Chief Fire Officer & Accident Prevention Officer, Goodyear Tyre & Rubber.

French Cement Record

In April, 1955, the output of cement in France reached 912,000 tons, a level never hitherto attained. It was more than triple the pre-war amount, and exceeded by 12 per cent the tonnage produced in April, 1954. With 9,400,000 tons of cement in 1954, production in France exceeded by 160 per cent that of 1938, and by 85 per cent the maximum attained between the two wars.

Battelle Institute Offers Aid

WHEN Dr. Clyde Williams, president and technical director of the Battelle Institute, Columbus, Ohio, met Scottish businessmen at Glasgow on 7 June, he offered the facilities of his organisation in undertaking research work for the advancement of British industry.

Before the meeting Dr. Williams explained at a Press conference that the institute had a staff of 2,500 workers. In the last two years it had opened a small research institute at Geneva, and another at Frankfurt.

Founded by an industrialist who realised the need for a research organisation to improve American industry, the institute, said Dr. Williams, was non-profit earning, but charged fees for the services of research workers who undertook studies and provided a solution to the problems facing individual firms or organisations.

They were interested in almost all lines of industrial applications of scientific discoveries in the field of mechanical, electrical and hydraulic engineering, iron and steel, plastics, petroleum and all types of chemicals. He added that they were considering the possibility of setting up research laboratories in Britain. Meantime he was making a tour of industrial centres in Britain and intended later to go to the Continent.

To Combat Corrosion

AN important step towards closer European co-operation in science and technology was made two years ago by the creation of the European Federation of Chemical Engineers. A further step towards this goal has just been taken with the formation of the European Federation of Corrosion on 19 May, on the occasion of the Convention of Chemical Technology in Frankfurt am Main. Thirty-three technical and scientific societies from eight European countries (Germany, France, Italy, Luxemburg, Austria, Sweden, Switzerland, Spain) met to discuss the phenomena and causes of corrosion. Norwegian and Spanish societies which were absent, declared their willingness to collaborate.

The object of the new Federation is to foster European collaboration in the field of research for combating and protecting materials for the benefit of all member nations.

The European Federation of Corrosion has two offices, one at the Société de Chimie Industrielle, 28 rue Saint Dominique, Paris 7e); the other at the Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt/M., Rheingau-Allee 25.

RS & Nuffield Awards

THE third group of awards under the Royal Society and Nuffield Foundation Commonwealth Bursaries Scheme to provide facilities for increasing the efficiency of scientists of proved ability by enabling them to pursue research in other countries has recently been made. Among those who received awards is Professor S. R. Palit, Indian Association for Cultivation of Science, Calcutta, who comes to this country in July to study the use of radioactive compounds and photochemical techniques in polymerisation at Birmingham and other centres.

Littleborough Plant

The plant being built by Armour & Co. Ltd. at Littleborough, Lancashire, to produce cationic and non-ionic chemicals is nearing completion and several experimental and pilot plant quantities are available in commercial amounts. Full information of the Armour range of chemicals is published in a folder, 'Introducing Armour Chemicals', recently issued by the company.

Metallurgists Visit Sheffield

Metallurgists from all parts of the world visited Sheffield on 6 June to see British steel-making and research. They inspected the laboratories of the British Iron and Steel Research Association, Firth Brown's steelworks, and the Appleby-Frodingham works of the United Steel Companies Ltd.

Benzol & By-Products

An extraordinary meeting of Benzol & By-Products to consider placing the company into voluntary liquidation has been called for 4 July. Proposals made by the directors for distribution were rejected by shareholders and the company applied for directions to the Company Adjustment Tribunal. The tribunal awarded a premium of 2s. per share to preference holders, plus dividend arrears; the balance of assets to ordinary holders.

SYSTEMATIC HANDBOOK OF VOLUMETRIC ANALYSIS. By Francis Sutton. Thirteenth edition, revised by Julius Grant. Butterworths Scientific Publications, London. 1955. Pp. xiv + 752. 63s.

'The rapid strides in all branches of industrial science and art during the last 10 or 15 years have, in a great measure, been aided, if not instigated, by chemical knowledge . . . the same remark applies, also, to medicine, pharmacy, agriculture, and general commerce so that practical chemistry has become a thing of general need in technology.' With these remarks Francis Sutton prefaced the first edition to the above book in 1863 and thus laid his claim for writing a reference book on a wide range of analytical methods—a book, which has played such a big part in the instruction of chemists that, in the past 92 years, no less than 12 editions have appeared and been acclaimed in the chemical world. The significance of these early remarks of Francis Sutton is equally valid to-day. The publication, therefore, of a 13th edition needs no justification since the last edition made its appearance 20 years ago.

The plan of earlier editions has been followed but much new matter has been added; almost every page bears evidence of revision in accordance with recent improvements in method and technique. General theoretical considerations are now assembled in a section of their own (Part 1) instead of being distributed throughout the book. The theory is elementary and is based on the classical, though practical, Arrhenius treatment. Part II deals with methods, instruments and apparatus, but very welcome additions to this section are such topics as micro-volumetric methods, micro-diffusion analysis and the standardisation of volumetric apparatus.

The remaining parts deal with, as in earlier editions, acidimetry and alkalimetry, analysis by oxidation or reduction, analysis by precipitation reactions, electrometric methods, applied methods of analysis (inorganic and organic substances), analysis of natural waters and sewage, and the volumetric analysis of gases. Useful inclusions are methods for the analysis of metals, such as rhodium and platinum, commercial compounds such as penicillin, the sulpha drugs, and the vitamins. The Karl Fischer reagent for water and its applications are fully treated and the new EDTA method for the hardness of water determination finds a place among the pages on water analysis. This material, together with a wide selection of literature references, some as recent as 1953 and 1954, at the end of each part, bring 'Sutton' right up to date. To say that this volume is comprehensive is an understatement.

Among the criteria of progress of a new edition, some, well-acquainted with former editions, will list the corrections of points to which they may have taken exception in the past. With the revision of the present edition they will not be disappointed. The reviser is to be congratulated for his efforts, in carefully appraising the criticisms of former editions and altering or rejecting where necessary: for example, the omission of Lenssen's method for the determination of tin, and the inclusion of conductimetric methods.

The undoubted excellence of this work is acknowledged; but, in the interest of bringing the contents even more up to date, a few suggestions are given. The acid-base indicators (page 98, *et seq.*) litmus, azolitmin, phenacetolin, turmeric, lacmoid, congo red, and the indicators for the titration of alkaloids are surely obsolete and could readily be omitted. The Wells and Mitchell's method (page 452) for the determination of titanium is not one to be recommended; it gives low results. The standardisation of potassium permanganate by

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means of metallic iron (page 197) is not a method used nowadays. The statement concerning delivery by a pipette, 'the jet is then stroked off the wall of the vessel' (page 46) is probably not in agreement with NPL specifications. Finally, there is a misspelling of 'ethylenediaminetetraacetate on page 573, line 9.

The output of analytical methods is more numerous now than ever before and individual experience of all methods is not possible: it is, therefore, essential that the chemist in the pure and applied branches should have a reliable, up-to-date, standard reference book on his shelf. 'Sutton' fills that role. The excellence of the applied methods has made 'Sutton' in the past, and while it continues to extend and keep abreast of modern advance, as in the present edition, it will always remain a "best' seller.

The fine line drawings, the printing and, indeed, the whole publication are first class and reviser, printer and publisher are to be complimented on their production.—ROBERT J. MAGEE.

EXPERIMENTAL CHEMISTRY. Part I. Qualitative and Volumetric Analysis. By James E. Garside and P. A. Claret. Sir Isaac Pitman & Sons Ltd., London. 1955. Pp. vi + 90. 9s.

Many of the standard textbooks on analysis are of too advanced a nature for the elementary student and contain material which is both unnecessary and confusing to him. The standard of chemical knowledge possessed by a student who has just taken the ordinary level GCE is not very great and the need arises for a handbook which describes, simply and accurately, all the practical work necessary for an intermediate or scholarship course without assuming anything more from the student than the ability to balance a chemical equation. The present volume is an attempt to satisfy this need.

In accordance with the modern trend, semi-micro techniques are used throughout the qualitative section. If macro-methods are preferred, however, there should be no difficulty in scaling up quantities of materials and reagents. The authors emphasise that semi-micro analysis is not an expensive technique as, with the exception of the centrifuge, all the necessary apparatus can be made in the laboratory.

Once the concept of equivalents and equivalent weights is grasped the volumetric section should present no difficulties to the beginner. Each exercise is explained fully and the method of calculation is given in detail.

This book should prove a useful guide to the student who is just starting the serious study of chemistry. The price is not excessive, and the semi-stiff cover might well be an advantage in a book which will often be required to lie open on a laboratory bench.—J.P.S.J.

ORGANIC REAGENTS FOR METALS & OTHER REAGENT MONOGRAPHS. Vol. I. By the laboratory staff of Hopkin & Williams Ltd. Edited by W. C. Johnson. 5th Edition. Hopkin & Williams Ltd., Chadwell Heath, Essex. 1955. Pp. viii + 199. 15s.

Most analytical laboratories in this country will already possess one of the previous editions of this well-known booklet on organic reagents for inorganic analysis. Although this new enlarged edition does not claim to be an exhaustive treatise on the subject, it is a very useful bench aid to the practising analyst, and contains considerably more information than its predecessors. The book is a collection of 24 monographs on reagents for metals and various ions. The inclusion of the monograph on the Karl Fischer reagent for the determination of moisture is in keeping with the inorganic nature of the subject matter, but it is difficult to understand why it was found necessary to incorporate the sections on the use of 4-aminophenazone and indanetrione hydrate. These are out of place and would best be included in the corresponding booklet on organic reagents for organic analysis.

It is disappointing to find that the chapter on the Fischer reagent does not give details for the determination of moisture in inorganic materials although a few references in the bibliography may be useful in this connection. The equation given for the reaction between the Fischer reagent and water is inaccurate. In actual fact one molecule of iodine reacts with only one molecule of water, not two as shown. The skeleton equation should therefore read:—

$I_2 + SO_2 + H_2O \rightarrow 2\ HI + SO_3$

The chapter on the use of ethylenediamine tetraacetic acid is a welcome addition to this new book. It is perhaps unfair to make criticism of the omission of certain EDTA methods since this is such an extensive field, but the inclusion of some details of recent new complexometric indicators would have considerably enhanced the value of this section, e.g., the phthalein complexone indicator of Schwarzenbach and co-workers, and the catechin violet indicator of Malat Suk and Ryba. The latter indicator permits visual titration of several metals forming EDTA complexes in acid solution, in contrast to Eriochrome and Murexide, and it may also be used in the alkaline region. The work of Blaedel and Knight on the preparation of primary standard purity disodium EDTA also deserves mention.

Much of the recent work on several reagents is relegated to mere mention in the supplementary bibliographies. This does bring the work described in the individual monographs up to date after a fashion, but a brief resumé of some of the more important papers in the supplementary references would have been extremely valuable, and would not have increased the size and cost of the book unduly.

The book has much to recommend it to those not requiring a more advanced treatise on the subject. The individual monographs are written clearly and concisely and the whole production shows remarkable continuity of style in spite of the large number of co-authors involved. The choice of subject matter is calculated to make the book most useful to a great number of chemists engaged in inorganic analysis.—T. S. WEST.

STEWART'S SCIENTIFIC DICTIONARY. By J. F. Stewart. Stewart Research Laboratory, Alexandria, Virginia. I. R. Maxwell & Co. Ltd., London. 4th edition. Pp. 788. 63s. 6d.

The title of this book is misleading and its original one, 'The National Paint Dictionary' was far more suitable. As a matter of fact the book is very similar to H. W. Chatfield's 'Glossary of Terms Used in the Paint, Varnish and Allied Trades'. In his preface the author states that the definitions given are not his own but come from 'a cross section of the opinion of leading technical and scientific men'. For the sake of accuracy he should have added the words 'engaged in the paint trade'. Anyone who purchases this book as reference to science in general or even as an aid to industrial chemistry will be extremely disappointed. On the other hand it is a useful reference to chemical and technical terms and phrases, trade names, raw materials and processes used in the US surface coatings industry. However, the existence of Chatfield's 'Glossary of Terms', which covers very much the same ground and from the British viewpoint, and which sells at half the price, makes it impossible for us to recommend this book.—A.B.

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CATALYSIS. Vol. 2. Fundamental Principles (Part 2). Edited by P. H. Emmett. Reinhold Publishing Corporation, New York; Chapman & Hall, London. Pp. vi + 473. 96s.

This volume is the second in the series and contains six chapters by an imposing list of contributors. The first of these entitled 'Classification of Heterogeneous Catalytic Vapour Phase Reactions' by W. B. Innes is a very fine example of the way in which extensive information should be presented. In addition to over 200 references at the end of the chapter there are some hundreds of additional references in a series of tables dealing with a great variety of catalytic reactions. Sufficient explanation and description have been given to make the chapter pleasant reading and not a mere catalogue of data. As a source of information on catalytic reactions it will be invaluable.

The chapter on 'Reaction Rates and Selectivity in Catalyst Pores' by A. Wheeler provides a link between the chemistry and chemical engineering of catalysts in that it deals with the effect of pores on the observed kinetics of catalytic reactions. Pore size distributions and the effect of pores on the specificity of catalytic processes are also considered.

H. M. Hulburt has contributed two chapters on 'The Nature of Catalytic Surfaces' and 'Nature of Complexes on Catalytic Surfaces.' The first gives an outline of the various approaches that have been made to the study of the metallic state including band theory, the Pauling approach and the

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more recent work of Zener; semi-conductors are also discussed. All this is compressed into 66 pages and unless one has previous knowledge of the concepts involved the chapter is probably too condensed to be followed with ease. Nevertheless, the appropriate references are given and the chapter is written in a stimulating manner. The second of Hulburt's chapters is quite short and deals with heterogeneity of surfaces and extends the discussion of the solid state to the consideration of the nature of adsorbed complexes on metallic and oxide surfaces.

The chapter by a group from Professor Eyring's school entitled 'Theories of Heterogeneous Catalysis' includes a general account of thermodynamics of adsorption and the statistical thermodynamics of adsorption and catalysis. Taken by itself it is an interesting and comprehensive account—the main emphasis being on the advantages and limitations of the transition state method. However, it does not seem to have been adapted sufficiently to the requirements of the present series of volumes. There is some duplication of material already presented in Chapter 5 of Volume 1 by K. J. Laidler, e.g., Fig. 5 on page 312 of Vol. 2 is almost identical with Fig. 4 on page 236 of Vol. 1. Furthermore, the situation is not improved by the use of different symbols where similar equations are given in the two chapters. Again, the brief review of the solid state given in this chapter duplicates the more extensive review in the first chapter by Hulburt.

The last chapter by E. L. King on 'Homogeneous Reactions in a Liquid Phase' is a good account of the peculiarities associated with reaction kinetics in ionic solutions and also of acid-base catalysis.

Apart from the one major criticism mentioned above the book is well produced and well indexed. It should prove of great value as a work of reference.—C. KEMBALL.

CRIME DETECTION: MODERN METHODS OF CRIMINAL INVESTIGATION. By A. Svensson and O. Wendel. English edition translated by G. Middleton and edited by W. H. E. James. Cleaver-Hume Press Ltd., London. 1955. Pp. xvi + 376. 38s. 6d.

Because of the place that science now takes in the investigation of crime it might be assumed that this book should have much of interest in it for many chemists. The book, however, is by no means as comprehensive as its title suggests, and in addition it suffers from at least one serious fault. It is primarily intended as a police manual which will not only describe the correct procedure to use when investigating crime, but will explain reasonably simply why the precautions recommended must be taken, and what the aim of a scientific approach to crime detection is. A glance through the table of contents suggests, and a closer examination confirms, that the crimes dealt with are preponderantly those which can be classed as crimes against the person, with a decided emphasis on those crimes resulting in death.

Thus, to take only two results of crime which the average policeman must encounter much more frequently than a dead body —arson and forgery—neither is listed in the index. The writing on burnt documents, and bodies which have been burnt seem to be the only aspects of these two important branches of forensic science which receive other than passing mention in the book.

One could permit this partial treatment of the subject to pass, but looking at the book as a scientist a much more serious (and possibly consequential) blind spot on the part of the authors and of the English editor is evident. This is best illustrated by the editor's own words: 'This editorial introduction cannot be complete without mention of the part played by medical science in so much of what follows in this book. So much of English criminal law is concerned with offences against the actual person of a man that inevitably medical science is involved . . . the wonders of forensic medicine can be studied in detail to great profit by all persons who want more than a nodding acquaintance with such problems . . . medical men are entitled to . . . that freedom to do and report according to the dictates of the professional rules which in other countries may not be the case'.

One cannot protest too strongly against this perpetuation of the suggestion that forensic medicine is a thing apart rather than a branch of something much wider. It is true that on certain problems of detection only a medical man is competent to

speak. But equally, there are other problems where, in the past, his word has been accepted as an expert when he was no more competent to speak than any intelligent layman. It is worth contrasting the above view with that expressed in a comparable book published a few years ago in the United States of America, where it is stated with a great deal more truth: 'Among the laboratory personnel one of the most important members is the chemist. . . . A physicist should be included in the staff, although in a small laboratory the chemist may easily serve in both capacities. . . . The examination of fibre, hair . . . and similar materials requires the services of a biologist with a good knowledge of botany . . . . Next to chemical analyses in frequency are cases of questioned documents. . . . In a large laboratory one man may be required to devote his time to this study exclusively'. Here is a much broader interpretation of the part played by science as a whole in the detection of crime.

Having made these two drastic criticisms of the book, it remains to say that within its limitations the matter is well treated and should be of considerable help to police and lawyers as well as proving of interest to the forensic scientist. There is an extensive series of excellent, if at times somewhat gruesome, illustrations. There are extremely comprehensive and valuable lists of references at the end of each chapter for anyone wishing to follow up any of the topics dealt with, and a useful general bibliography at the end of the book. The production is above criticism, and nowhere has there been observed anything that would betray that the book is a translation.—CECIL L. WILSON.

USING CHEMISTRY. By Oscar E. Landford. McGraw-Hill Publishing Co. Ltd. London. 1955. Pp. xiii + 722. 34s.

This book is one of a type of publication which is more popular in the US than in this country. It is an attempt to make the science of chemistry readily accessible to a large public, and to illustrate fundamental laws by describing practical, everyday examples. As with any book that attempts to reach more than one level of reader, the serious student will not find much of interest and may well be irritated by its elementary nature and lack of detail. The layman who wishes to gain a general survey of modern chemistry and its applications might, however, find something of interest here, although he would obtain a somewhat biased impression as the author has kept the section on organic chemistry down to one chapter.—J.P.S.J.

The Chemist's Bookshelf

INTRODUCTION TO CHEMICAL PHARMACOLOGY. By R. B. Barlow. Methuen & Co. Ltd., London; John Wiley & Sons, Inc., New York. 1955. Pp. xiv + 343. 35s.

The physiological action of chemical compounds is classed in most textbooks of chemistry as a property to be mentioned if noteworthy, for example, the interesting effects of alcohols, the anaesthetic action of chloroform, the antipyretic properties of acetanilide and so on. The chemist considers these as isolated and incidental facts. This book classifies on the other hand not chemical substances but the various types of physiological, or rather, pharmacological action, mentioning under each heading the compounds responsible, which the physiologist considers as isolated and incidental. They will remain so until we acquire sufficient knowledge of how they act. The chemist would like to see them correlated. This book will help him to do so by extending his knowledge of the working of nerves. Consideration is confined largely to the nervous system. Vitamins, hormones—apart from local ones such as adrenaline—antiseptics and chemotherapeutics are not dealt with.

Each chapter is concerned with some particular effect, e.g., depression of specific CNS centres, stimulation of cholinergic synapses, etc. The emphasis is on mechanism of drug action. Much as the physiological mechanism is clearly explained and deduced the chemist cannot help feeling dissatisfied that so little is known about the precise chemical reactions involved and the precise operation of structural features which produce specificity. Theory and discussion are interspersed with names and formulae of active compounds. A pleasing feature is the clear fashion in which structural formulae of organic compounds, which incidentally are right up to date, are set out. Unfortunately that of camphor on p. 75 is given incorrectly.

The Chemist's Bookshelf

It is claimed that the book is written primarily for those to whom the subject is new. Certainly the chemist stands to benefit by studying it. Obviously the biologist could not learn much chemistry from it. The appendix is designed to provide enough biological background for those who lack it, but it is rather scanty, and elementary compared with the level of the discussion in the text, which moreover does not always have the advantage of clarity. For example, much space is devoted to the consideration of spasmolytics but the meaning of this term is not defined. It can be arrived at by much searching. This applies to many other physiological terms and conceptions referred to, which are not familiar to the chemist.

The author is a chemist. He has undoubtedly made a commendable contribution towards helping chemist and pharmacologist understand each other's point of view. It may well be that some chemists by studying this book will become sufficiently aware of the chemical problems of drug action still awaiting solution and sufficiently encouraged and interested as to undertake their solution.—M.C.

ANNUAL REVIEW OF NUCLEAR SCIENCE. Vol. 4. (1954). Annual Reviews Inc., Stanford, California. (UK Agents, H. K. Lewis Ltd.). 1954. Pp. 483. $7.00.

Like the previous issues in this series, this volume consists mainly of very detailed and comprehensive reports of developments in the last two or three years, written on the assumption that the reader is tolerably well acquainted with earlier work. This makes it valuable as a work of reference, though it would have less appeal for anyone seeking concise and readable surveys of nuclear science topics. Reviews like the present ones, once merely a convenience, have now become practically a necessity owing to the recent appalling acceleration in the rate of publication of new work. The chapter on 'Radioactivity in Geology and Cosmology,' which covers only the years 1951-54, ends with a list of 592 references. A few more years of this must surely lead to widespread mental indigestion among research workers.

Only three chapters in this volume deal with what are usually regarded as chemical subjects. 'Fission Radiochemistry' by Glendenin and Steinberg is an excellent survey showing how radiochemical studies on fission products have stimulated and provided material for theories of the mechanism of fission and nuclear structure generally—they have, for example, given support to the concept of unusual stability for nuclear 'closed shells' of 50 and 82 neutrons. 'Stable Isotope Dilution as an Analytical Tool' by Inghram is a clear and straightforward assessment of the applicability of this method which would be most helpful to anyone wishing to use it. 'Standardisation of Radioactive Sources,' by Manov, does not make very interesting reading to a non-specialist.

Advances in counting techniques are covered in chapters on scintillators, Cerenkov counters and improvements in counter electronics which make it possible to take advantage of the fast resolving times of these new counters. A chapter describes the world's proton synchrotons, including those being designed at present. There are two biological chapters, one dealing with the effects of radiation on enzymes, the other with the physiological action of radiation on vertebrates other than man. The remaining seven chapters consist mostly of recondite mathematical physics.

The authoritative standard prevailing throughout this publication makes it a desirable acquisition for any laboratory where nuclear science research is done.—H. G. HEAL.

For the Study of Slurries

AN automatic recording balance for measuring the settling rates and, indirectly, the particle size distribution of the solids in slurries has been developed and tested at the Battelle Institute, Columbus, Ohio.

Its chief advantage over conventional equipment of this type is the novel method of making the system automatic in operation and of recording the data as a complete settling rate curve. An over-all sensitivity of two milligrams, a full scale response time of 10 seconds, and a high degree of stability can be obtained. The adaptation for the study of slurries at elevated temperatures is described.

It should prove to be a useful tool wherever measurements of the change in density of a fluid medium as a function of time or temperature are required.

HOME

Dangerous Goods & Explosives in Ships

The 12th list of Amendments to Appendix A of the 1951 Report of the Departmental Committee on the Carriage of Dangerous Goods and Explosives in Ships can now be obtained from H.M. Stationery Office, price 6d. Further amendments will be published by HMSO when necessary.

Fuel Course

The five-day fuel efficiency course organised by the National Industrial Fuel Efficiency Service and the Southern Region Council for Further Education will start on 25 September and not the 26th as reported.

CBMPE Party in Rome

The British petroleum equipment industry was very well represented at the Fourth World Petroleum Congress which was held in Rome 6-15 June. Some 81 representatives of 45 member-firms of the Council of British Manufacturers of Petroleum Equipment, headed by the chairman of the Council, Mr. Douglas Wilson, were present and they and their ladies acted as hosts at the CBMPE cocktail party on 10 June. Some 200 guests from 12 countries accepted the Council's invitation to be present. These included Lt.-Col. S. J. M. Auld, president of the Institute of Petroleum, Sir Leonard and Lady Sinclair, Mr. and Mrs. J. A. Oriel and M. Rene Navarre, of L'Institut Français du Petrole.

Malayan Rubber Pioneer Honoured

The founder of the Malayan rubber industry, Mr. Henry Nicholas Ridley, who will be 100 on 10 December, has been awarded the Colwyn Gold Medal by the Institution of the Rubber Industry. When Mr. Ridley became director of Singapore Botanic Gardens in 1888 he found there a few forgotten trees grown from the seeds of wild trees smuggled from Brazil. After many experiments, he discovered how best to extract their latex, with the result that when he left Malaya in 1912, the original £100 invested in rubber had risen to £82,000,000. The medal was presented to Mr. Ridley by the chairman of the Institution, Mr. S. A. Brazier, technical consultant to Dunlop's general rubber goods division in Manchester.

Winston Electronics Move

On Wednesday, Winston Electronics Ltd., manufacturers of specialised electronic equipment, took over their new factory at Govett Avenue, Shepperton, Middlesex. Telephone No.: Walton-on-Thames 2732.

Gas Council's Midlands Research Station

The Birmingham Research Station of the Gas Council will in future be known as the Midlands Research Station. It is now accommodated in the new laboratories at Wharf Lane, Solihull, Warwickshire.

Monsanto Stand in Brussels

Monsanto Chemicals Ltd. will exhibit four of their textile processing chemicals—Syton W 20, Syton 2X, Stymer S, and Santobrite—at the International Textile Exhibition starting in Brussels next Saturday until 10 July.

First Hospital Cyclotron Installed

The first cyclotron to be installed in a hospital was shown to the Queen when she visited a Hammersmith, London, hospital recently. The cyclotron, an accelerator of heavy particles (its electro-magnet weighs 120 tons) is used in the Medical Research Council's Radiotherapeutic Research Unit. The cooling system of its magnetic coil is fitted with Dunlop silicone rubber hose couplings, chosen because silicone rubber is not affected by the potassium dichromate in the cooling solution.

British Firm to Build Factory in US

To meet increasing US demands for densified wood laminates, Permali Ltd., of Gloucester, are to build a factory at Mount Pleasant, 32 miles south-east of Pittsburgh. Production is expected to begin by the end of this year. Permali's American subsidiary, Permali Inc., is in New York.

'Pewter of To-day' Exhibition

Professor A. E. Richardson, president of the Royal Academy, opened the 'Pewter of To-day' exhibition at Derry & Toms' Kensington, London, store on 9 June. The exhibition, which runs until 30 June, has been organised by the Tin Research Institute, a body engaged in research to devise new uses for tin. European countries represented are: Germany, France, Belgium, Denmark, Holland, Norway and Italy. Next to Britain, Germany is the largest exhibitor.

• OVERSEAS •

Bayer Works' Profits

Net profit of the Bayer Works at Leverkusen, Germany, for 1954 was DM.31.02 m., an advance from DM.27.3 m.

Australian Gas Plants Order

Head Wrightson Processes Ltd. announce that in conjunction with the Fluor Corp. Ltd. they have received an order for two gas dehydration plants from the Gas & Fuel Corp. of Australia. To be located at Morwell, each plant will process 18,000,000 cu. ft. of gas a day from brown coal deposits, and will serve the city of Melbourne.

Newfoundland Copper Ore Find

The discovery of copper ore in an abandoned copper mine at Tilt Cove, 200 miles north-west of St. John's, may revive the copper industry in Newfoundland. Found by a survey team of Bathurst Mining Corp. and Maritimes Mining Corp. led by Mr. M. J. Boylen of Toronto, it is estimated the seam may yield 5,000,000 tons of copper ore. Production is planned for early 1957 with an initial 1,000 tons a day.

Indian Calcium Chloride Trade

The Indian Government's resolution on the Tariff Commission's report on protection of the calcium chloride industry has been published. The Commission recommended that protection to the industry should not continue after 31 December, this year. The Government accepted this and ancillary recommendations regarding formulations of standing specifications and the development of export markets.

Analytical Chemistry Congress for Lisbon

Professor I. M. Kolthoff, president of the analytical section of the International Union of Pure and Applied Chemistry, has announced that the Congress on Analytical Chemistry will be held in Lisbon from 9 to 16 September next year. Professor Fernando Pires de Lima, Minister of Education, has appointed Professor D. Antonio Pereira Forjaz to be president of the organising committee. Arrangements for the meeting will be directed by Professor Pierre A. Laurent, Instituto Superior Tecnico, Avenida Rovisco Pais, Lisbon, Portugal, and all inquiries should be sent to him.

French Chemical Statistics

The French National Institute of Statistics reports that production of chemicals in France in 1954 was 15 per cent more than in 1953. For the first quarter of this year production was increased by eight per cent over that for the corresponding period last year.

Microfilms Available

An agreement has been made with University Microfilms, 313 N First Street, Ann Arbor, Michigan, giving them permission to microfilm current issues of THE CHEMICAL AGE and to distribute copies to libraries. Microfilm copies will be supplied only to subscribers of the journal.

Canadian International Fair

Dr. Ludwig Erhard, Minister of Economic Affairs for the Federal Republic of Germany, declared officially open the Canadian International Trade Fair in Toronto on 30 May. Canada, with 97,765 sq. ft. was the largest exhibitor and Czechoslovakia was second with 22,500. Germany occupied 20,860 sq. ft. and Britain was in fourth place with 16,040. Firms from 27 countries were represented. The exhibition lasted for 10 days.

Cheaper Ethylene Glycol Diacetate

A process developed by the Celanese Corp. of America has resulted in ethylene glycol diacetate being produced more economically. Volume production has started at the Bishop, Texas, plant and a favourable price basis has been established for ethylene glycol diacetate for use as a solvent in cellulose ester lacquers, fluorescent-type paints and printing inks, and as a fugitive plasticiser in baked vinyl coatings, and as a perfume fixative.

International Nickel Co. in Australia

The International Nickel Company of Canada, producers of 90 per cent of the world's nickel, will take a hand in the development of the newly-found nickel deposits in South Australia. The company will give financial and technical assistance to a new Australian company, South-Western Mining Ltd. The deposits, found last year, cover an area of 4,000 sq. miles and are believed to be the richest untapped source in the world.

PERSONAL

Cambridge University has conferred the honorary degree of Doctor of Laws on SIR CHARLES TENNYSON, C.M.G., Dunlop secretary from 1928 to 1948.

DR. ROGER GAUDRY has been elected president of the Chemical Institute of Canada. Born in Quebec City, Dr. Gaudry joined the teaching staff of Laval University in 1940. In 1945 he was appointed associate professor in biochemistry in the School of Medicine, and in 1950 became full professor of general and organic chemistry. He resigned last year to become assistant director of research for Averst, McKanna & Harrison Ltd., in Montreal.

MR. F. L. WARING, joint managing director of Coalite & Chemical Products Ltd. since 1949 is now sole managing director. Mr. Waring has been with the firm nearly 40 years. Three new directors appointed to the board are: MR. A. GOODSELL, company secretary for the past 12 years; MR. G. S. POUND, recently appointed assistant to the managing director after 17 years in charge of the refinery; MR. J. H. ORR, formerly northern representative and sales manager.

MR. HARRY STEINMAN, chairman of Manchester Pharmaceutical Association, is the new president of the Pharmaceutical Society of Great Britain. His vice-president is MR. GRANVILLE SHAW, F.P.S., Long Eaton, Nottingham, a past chairman of the Nottingham branch of the Society and a member of the Pharmacy Advisory Committee of Nottingham University. For the tenth successive year MR. W. SPENCER HOWELLS, M.P.S., Richmond, has been elected treasurer.

DR. H. E. Z. GORDON, until recently Battelle's UK representative, is now devoting his time to the interests of the Battelle Development Co. Ltd., of which he is general manager.

MR. C. E. PAUL, M.Inst.R., chief engineer, and MR. L. L. WATSON, A.S.A.A., secretary, have been appointed divisional directors of the Carbon Dioxide Company.

MR. C. E. B. MACQUEEN who has joined Genatosan Ltd. as commercial manager, has also been appointed to the board. He succeeds MR. A. S. WOODHAMS who has joined Fisons Ltd., of Felixstowe. Mr. Macqueen was formerly with British Xylonite Co. Ltd.

Edwin Danks & Co. (Oldbury) announce the retirement of MR. W. F. JOHNSTON, M.I.Mech.E., M.I.F., their chief engineer. He is succeeded by MR. H. MCANDREW, A.M.I.Mech.E., A.M.I.Ref.

We have been asked to correct an error by APV-Paramount regarding the name of their new northern representative who is MR. E. L. ILLSLEY, not Illsey, as they had announced.

At its AGM, held in the Grand Hotel, Llandudno, on Friday, 10 June, the Oil and Colour Chemists Association made DR. L. A. JORDAN (Director of the Paint Research Station, and a past president) an honorary member. His work for the Association and for the industries it served was recalled by the retiring president, MR. H. GOSLING, who presented him with a scroll which recorded his election.

MR. C. W. A. MUNDY, who has been president-designate for the past year, took over the duties of president of the Oil & Colour Chemists Association at the end of the annual conference, and was invested with the presidential badge of office at the banquet on Friday evening. MR. R. F. G. HOLNESS, DR. S. R. W. MARTIN and MR. F. E. MORLEY were elected to the Council to fill the vacancies due to retirement by rotation. The following honorary officers will serve again during the ensuing year: *hon. secretary*, DR. J. E. ARNOLD; *hon. treasurer*, MR. N. A. BENNETT; *hon. editor*, MR. M. H. M. ARNOLD; *hon. research & development officer*, MR. P. J. GAY.

The Yorkshire Dyeware & Chemical Co. Ltd. of Leeds announce the appointment of MR. S. G. A. WISE, general manager of their Selby branch, to the board of directors. Before transferring to Selby, Mr. Wise was head of the Syntan department at Kirkstall Road, Leeds.

Compoflex Co. Ltd. have appointed MR. S. A. ORRELL to their sales staff. He will cover Lincoln, Leicester, Nottingham, Rutland, and the East and West Ridings of Yorkshire from the company's Northern Flexible Centre at Oldham. MR. K. REAY, who formerly covered these areas, has been moved to the North of England and Scotland. MR. A. M. DENCH, appointed to the sales staff in London, will assist MR. P. MACDOWALL covering London and the home counties.

Obituary

The death has occurred suddenly at his home at Haswell (Co. Durham), of MR. A. K. MONTGOMERIE, manager for 18 months of the Haswell Sabulite factory of Imperial Chemical Industries Ltd. He was 42 years old and joined I.C.I. 12 years ago. He was manager of the firm's Roburite factory at Wigan before moving to Haswell.

Wills

MR. LEWIS JOHN ERIC HOOPER, of Chiddingfold House, Chiddingfold, Surrey, chairman of Doulton & Co., pottery & sanitary ware manufacturers, left £702,078 net (duty paid £481,667).

MR. SAMUEL WILLIAM FROST, of 51 Wergs Road, Tettenhall, Staffs, director of Frost & Sons (Moxley) Ltd., galvanisers; and Frost & Sons (Tividale) Ltd., galvanisers, Tipton, left £52,823 (£48,352 net).

MR. ARTHUR MULLETT, Dorset House, Ham Lane, Pedmore, near Stourbridge, retired glass manufacturer, left £10,711 (£10,625 net).

Bituminous Paints

Evode Laboratory Investigations

PAST failures of bituminous paints have been the subject of investigation and it has been found that these are often due to use of a grade not applicable to the specific job. Many of these problems have been tackled by the chemists of Evode Ltd., of Stafford, with the result that formulations have been produced to meet a wide variety of circumstances.

The sealing of brickwork, masonry and cement against heavy rain is of great importance in the building industry, and the Evode chemists have produced Evode Wintrex, a colourless liquid which, when applied cold to the surface under treatment, achieves penetration and thorough waterproofing at the rate of one gallon to an area of 20-30 sq. yards. Appearance remains unaffected after treatment.

It has been established that the most important factor in any paint system able to protect against corrosion is the primer, and concurrent with researches into bituminous paints another section of the Evode laboratories is concentrating on an improved primer. The conclusion has been reached that an efficient primer must contain red lead powder dispersed in a vegetable oil medium in such proportion to give the soap formation always essential to a corrosion resistant coating.

The protection of the internal surfaces of drinking water containers demands complete certainty that there will be no contamination. Evode Black 505D and Evode pure bituminous enamel C103 were used to waterproof six drinking water containers at the House of Commons. The Ministry of Works, who carried out this work, have ordered similar materials for drinking water containers at resettlement camps and at War Office establishments.

Considerable importance is attached in the building industry to both internal and external decoration, and Evode have developed coloured bituminous paints in a wide variety of shades; light grey, dark Admiralty grey, pale cream, brilliant green and Venetian red to name a few. These bituminous paints can be reduced to spraying consistency by addition of the appropriate Evode thinner.

Where the best protective medium is black bitumen, but for aesthetic reasons a black finish must be avoided, a range of colour films have been developed for painting over the black base. Extensive tests have shown that the black does not bleed through under any circumstances.

'Atoms for Peace' Offer

President Eisenhower has offered all free nations financial aid and technical facilities to develop atomic energy. In an extension of his 'Atoms for Peace' programme, he is to ask Congress to meet half the cost of providing atomic reactors for research to friendly countries.

Publications & Announcements

FURANE cements have many practical applications because of their resistance to solvents and corrosive substances. Difficulties arise, however, in their manufacture, the chief one being the introduction of a catalyst as setting agent. This catalyst, which is an acid, can either be incorporated in the cement filler or added as a third constituent when the cement is mixed. The disadvantage of this latter method is that the craftsman mixing the cement has to judge the quantity of acid to be added. This quantity is very critical and even a small error may result in an unsatisfactory product. On the other hand, addition of the catalyst by the manufacturer also causes difficulties, some of which have been overcome by Corrosion Proof Products Ltd., 37 Portman Square, London W.1. The makers claim that their new product is superior in many ways to previous cements. The advantages are greater uniformity, adhesion and chemical resistance. There is still room for improvement, however, especially with regard to adhesion to glazed surfaces. The company has also put out a leaflet in which a somewhat over-simplified explanation is given of the term *p*H. This should serve to give the non-technical man some idea of what is meant by this mysterious symbol.

* * *

TRION Electronic Air Cleaners and Trion Oil Mist Precipitator are made by the Harris Engineering Co. Ltd., London S.E.17. The electronic air cleaners are economical in use and are claimed to have an efficiency of 90 per cent. An important feature is the built-in washing system by means of which the installation can be cleaned without workers having to enter the duct-work. Oil mist precipitators are specifically designed for the elimination of coolant oil mist, and smoke emanating from high speed cutting, grinding and machining operations. Such oil, if it is not eliminated, causes potential fire and falling accident hazards.

* * *

PEOPLE who regard themselves as irrevocably earthbound might find some startling information in the *Journal of the British Interplanetary Society*. The May-June edition, which has just been issued, contains articles on the legal aspects of space travel, together with 'Using Hydrogen Peroxide' and 'Liquid Oxygen as a Rocket Propellent'. It could be assumed from reading this journal that the age of space travel is almost upon us.

* * *

PRACTICAL guides to the selection of fire-fighting appliances are contained in a list published by the Pyrene Co. Ltd. of Great Britain, 9 Grosvenor Gardens, London S.W.1. This describes the best type of equipment to tackle any form of fire, as well as giving details of the Pyrene fire extinguisher hire maintenance plan.

* * *

ORTHODOX types of self-contained breathing apparatus work on the principle that the exhaled air is passed through a chemical purifying cartridge in which carbon dioxide and moisture are eliminated. The impoverished air passes into a breathing bag where it is enriched with the necessary oxygen from a supply carried in a cylinder. This 'closed-circuit' type of system suffers from the defect that the air contained tends to become very hot, with consequent discomfort to the wearer. S. F. Roberts Ltd., 214 Putney Bridge Road, London S.W.15, claim that these disadvantages can be overcome by the use of the 'Roberts' mark 54 self-contained compressed air breathing apparatus. In this apparatus air is supplied to the wearer exactly in accordance with his requirements. The air, which is obtained from a cylinder and is consequently clean and dry, is allowed to pass over the eyepiece of the mask, thereby preventing fogging of the lens. It is stated that this system can be worn for 35 to 75 minutes with complete security, depending on the nature of the work being performed.

* * *

ANYONE concerned with the buying and selling of plastics will find a copy of the Buyers' Guide to Plastics Materials and Machinery and Equipment to be of great use. This book, which supersedes the 1953 edition, has been compiled for the information of overseas buyers, but the information that it contains will be invaluable to home buyers as well. The guide is divided into two parts, the first containing a list of plastics materials listed alphabeti-

cally according to chemical type, and the second an alphabetical list of machinery and equipment for the plastics industry. The book concludes with an index of the trade names used in the guide and a list of the names and addresses of all manufacturers whose products appear in either part. Copies may be obtained from the British Plastics Federation, 47-48 Piccadilly, London W1, price 2s. 6d.

* * *

STAINS and reagents for all biological purposes are supplied by George T. Gurr Ltd., 136-138 New Kings Road, London S.W.6. Their latest price list contains prices for about a thousand dyes, indicators and other biochemicals. They are also authorised distributors for research biochemicals made by Sigma Chemical Co., St. Louis, US.

* * *

CONTINUOUS neutralisation of acid effluents is possible using equipment developed by Kestner Evaporator & Engineering Co. Ltd., 5 Grosvenor Gardens, London S.W.1. Waste acid is discharged at a predetermined rate into the neutraliser vessel which is fitted with a high efficiency vortex stirrer. The neutralising medium can be fed in as a solid, as a slurry, or as a true solution. The correct treatment of effluents varies according to the locality, but Kestners claim that, as a result of many years' experience of this subject, they have evolved methods of dealing with this problem, and they will be pleased to give advice to anyone requiring it. This information is contained in leaflet No. 295 published by the company. Leaflet No. 282/A, which has also just been published, describes the range of chemical plant manufactured by Kestner. This includes crystallisers, distillation plant, evaporators and metal pickling plant.

* * *

THE Bryan Donkin Co. Ltd., are now manufacturing Rateau high speed centrifugal gas boosters and exhausters of the latest design. At the present time they have orders for 24 sets, several of which are installed and in operation. The duties of these machines to date range from 300,000 cu. ft. per hour, at 50 in. w.g. outlet pressure to 1,000,000 cu. ft. per hour at 15 lb. per sq. in. outlet pressure, the latter duty being that of a machine on order for the Quebec Hydro Electric Commission of Montreal.

THE Baird & Tatlock Bulletin and Laboratory Notes Series II No. 21 describes the mobile petroleum laboratory built by BTL for the Ministry of Supply. The laboratory is designed to carry out standard IP and ASTM tests on petroleum products and fuels. Air temperature and humidity are controlled by an air conditioning plant, and in tropical temperatures chilled water may be provided by a special trailer plant. Careful attention has been paid to the storage of instruments and apparatus, much of which is of a delicate and fragile nature. The laboratory is equipped with standard laboratory glassware, balances, hotplates, tools and chemicals. These notes also include an account of the BTL universal Kjeldahl apparatus which is suitable for laboratories where large numbers of nitrogen determinations have to be carried out, and the BTL 'Astip' oil testing centrifuge.

* * *

FILTRATION and recovery of dust and fumes is becoming an increasingly important problem in modern industry. The Favorit Filter Process, designed by the Power-Gas Corporation Ltd., Stockton-on-Tees, has found applications in such industrial processes as smelting and refining, crushing, grinding, screening and milling operations, the manufacture of chemical powders, and in drying operations. A number of compartments containing fabric filter sleeves are connected in parallel and gases to be filtered are drawn through by means of an exhaust fan. Full details of the process can be obtained from the company.

* * *

SILICONES, as is well known, have excellent electrical properties and are extremely stable to heat. They are also inert chemically and highly water repellent so find considerable use in the electrical industry. Midland Silicones Ltd., 19 Upper Brook Street, London W.1, have produced a booklet which describes the insulating properties and uses of some of their products. Silicone varnish films will withstand temperatures of 200° C or even higher for prolonged periods. Among suggested applications are: sheet insulation for high temperatures uses, silicone-varnished glass sleeving, silicone treated tying cord and silicone/glass laminates which have good dielectric properties over a wide range of frequencies.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

SPINNEY CHEMICAL CO. LTD., London S.W. —6 May, mortgage and charge to National Provincial Bank Ltd. securing all moneys due or to become due to the bank; general charge. *Nil. 31 December, 1953.

Satisfactions

W. & J. GEORGE & BECKER LTD., Alperton, chemical apparatus manufacturers, etc. —Satisfaction 9 May, that part of the property or undertaking comprised in a debenture registered 21 July, 1952 (present and future loose plant, machinery, equipment & vehicles), has been released from the charge.

Increases of Capital

LEATHER'S CHEMICAL CO. LTD., vitriol manufacturers, by £34,000 beyond the registered capital of £26,000; JEYES' SANITARY COMPOUNDS CO. LTD., from £150,000 to £400,000; CECA (NORTHERN IRELAND) LTD., from £100 to £50,000.

Company News

British Alkaloids Ltd.

For the year ended 31 March British Alkaloids Ltd. made an increased gross profit of £7,660 compared with the previous year. Advertising expenditure increased by £2,510. After all appropriations there is a balance standing to the credit of this year's profit and loss appropriation account of £21,035 available for the payment of a final dividend which the directors recommend be 2.4d. per share, less tax, on the issued share capital of the company. The final dividend will require £10,465, which figure is debited in the profit and loss account. Total reserves and surplus profit and loss account balance is £123,403.

Dunlop Rubber Co. Ltd.

The Rt. Hon. Lord Baillieu, K.B.E., C.M.G., the chairman, presided at the 56th AGM of the Dunlop Rubber Co. Ltd. at the Piccadilly Hotel, London, last Monday. In his statement, Lord Baillieu said: Trading during 1953 had been on a steadier basis than in the previous year. This pattern continued in 1954. Business activity in the UK resulted in a substantial increase in demand in most of our branches. Overseas demands also increased, with the result that the turnover of the group, including inter-company sales, showed an increase from £243,000,000 in 1953 to £262,000,000. Over all the volume of the group's business increased by about 15 per cent.

Borax Consolidated Ltd.

Borax Consolidated Ltd. have appointed Lazard Bros., & Co. Ltd. in London; Lazard Frères, New York, Lee Higginson Corporation and F. Eberstadt & Co. of New York, to act as financial advisers in connection with certain corporate and financial matters now under consideration.

Coalite & Chemical Products Ltd.

The trading results of Coalite & Chemical Products Ltd. for the year ended 31 March compared with previous years; after allowing for taxation (£263,886) the net profits of the group total £238,650. After deducting £6,087 profits retained in the accounts of the subsidiary companies, and adding £116,429 brought forward from last year, £348,992 is available for appropriation. Of this, £150,000 has been transferred to general reserve. Approval of a final dividend of eight per cent was asked for. With the exception of the programmed reconstruction of an old battery of retorts at Askern, all units operated to capacity throughout the year. By the end of this year three new batteries should be in operation at Bolsolver, and three more are planned for the same site. The estimated cost of the expansion programme is £900,000.

Assoc. Portland Cement Manufacturers Ltd.

The Associated Portland Cement Manufacturers Ltd. holds over 80 per cent of the equity of The British Portland Cement Manufacturers Ltd. and 100 per cent of Alpha Cement Ltd. equity. Trading surplus

(continued on page 1360)

increased by £1,894,000 to £11,053,000. In 1953 cement had to be imported to sell at home trade prices, which involved a loss of over £800,000. The sum of £3,578,000 (£690,000 more than last year) was set aside for depreciation and replacement of plant and machinery, leaving £7,475,000. Provision for taxation, which in 1953 included £172,000 for Excess Profits Levy, increased by £636,000 to £3,984,000. After making all provisions and appropriations the amount available for distribution is £122,331 higher than that of a year ago, and the directors recommend a final dividend of 3s. on each £ unit of ordinary stock amounting, after income tax reduction, to £690,000.

Courtaulds

Courtaulds are recommending a final dividend of 6 per cent for the year ended 31 March making 10 per cent for the year on the £48,000,000 ordinary capital. This is an increase of two per cent over the previous year's equivalent total of eight per cent. Group balance from trading and investment income expanded from £18,975,328 to £20,048,321, and with total provisions and reserves for tax down from £11,410,602 to £8,773,441, the group's net balance, after deducting minority interests, is higher by nearly £3,500,000 at £11,016,032. The ordinary distribution will take £2,712,000, against £2,112,000. The company's new investments at home and abroad are showing satisfactory profits.

Market Reports

LONDON.—Conditions on the industrial chemicals market show very little change either as regards activity or prices although here and there spot quotations for items in temporary short supply are dearer. At the time of this report the end of the rail strike had just been reached and each day it extended had brought increasing anxiety to the chief consuming industries. There has been some understandable pressure for contract deliveries. A good volume of export inquiry is in circulation but many shipments are held up because of the dock strike. The coal tar products section of the market were more seriously affected by the difficult conditions since coal deliveries to the industry are dependent almost entirely on rail transport. It is reported that cresylic acid will be dearer during the second half of the year.

MANCHESTER.—Chemical trade in the Manchester area has been dominated by the rail strike. Emergency arrangements for transport of supplies from the producing to the consuming end staved off the worst results, but most users in the textile and other leading industrial outlets were compelled largely to rely upon reserves to maintain uninterrupted working. Up to the end of the strike they were able to do so without serious interruption. This was the experience in the by-products trade. The demand for most descriptions of fertilisers continues on a seasonally quiet scale.

GLASGOW.—The Scottish heavy chemical market suffered from the effect of the rail strike, and the supply position was becoming difficult when the strike ended. Manufacturers did their utmost to maintain supplies as far as possible by any available means of transport. During the past week, however, a fair volume of orders have been received, and prices on the whole are still remaining steady. The prevailing position is also having its effect on the export market.

Next Week's Events

WEDNESDAY 22 TO 25 JUNE

The Institute of Physics

Glasgow: Royal Technical College. Joint Group Summer Meeting with Scottish Branch. Meet 9 a.m. Wednesday.

The Fertiliser Society

London: Lecture Hall of Geological Society, Burlington House, Piccadilly, W.1, 2.30 p.m. 'The First Installation of a Phosphoric Acid Plant according to the Anhydrite Method at Vercilli, Italy,' by Sven Nordengren, Italo Francia, Ph.D., and Rolf Nordengren.

THURSDAY 23 JUNE

RIC (London Section)

Chorley Wood: Visit to British Baking Industries Research Association, Chorley Wood, Herts, 2.30 p.m. (Coach 1.15 p.m.)

FRIDAY 24 JUNE

SCI (Pesticides Group)

Fernhurst: Visit to Plant Protection Ltd. Research Station, Fernhurst, Surrey, 11 a.m. Assemble Victoria Station News Theatre, 8.45 a.m. for coach.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

CHEMICAL ENGINEERS are required by an established company manufacturing intermediates for the plastics industry. Applicants, aged 23-28, should have a sound academic background, and be able to apply their knowledge to the problems arising in the operation and development of chemical plant. The vacancies are in the Technical Department and the work will involve experimental investigations leading to the design and subsequent commissioning of new or modified process equipment. The work is varied and will appeal to men who wish to extend their experience without specialising in a narrow field. Applications, giving relevant details, which will be treated as confidential, should be addressed to **BOX No. C.A. 3412. THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4,** quoting ref. R.85.

GRADUATES in **MECHANICAL** and **CHEMICAL ENGINEERING** required for progressive positions in the Research, Design and Production Divisions of THE POWER-GAS CORPORATION LIMITED. Training given to men without previous industrial experience. Apply to:—**STAFF PERSONNEL MANAGER, PARKFIELD WORKS, STOCKTON-ON-TEES.**

IMPERIAL SMELTING CORPORATION, LIMITED, invites applications from **METALLURGISTS, CHEMISTS** or **CHEMICAL ENGINEERS,** for openings in the Plant Investigation Departments at the Avonmouth and Widnes Works. Honours Degree is preferable, previous experience not essential and applications will be welcomed from persons completing their National Service. Opening also available for **PHYSICAL METALLURGIST** in Research Laboratory for investigational work on alloys. Applications, giving full details, to Personnel Manager, Imperial Smelting Corporation, Ltd., St. Andrew's Road, Avonmouth, Bristol, quoting reference **GRA/CA.**

INDUSTRIAL CHEMIST required by leading container closure manufacturers in Midlands. Progressive position requiring knowledge metal printing, varnishing, stoving, and metallurgy, associated with food packaging industry, Maximum age 35 years.—Written applications, with details of experience previous appointments, etc., to **P. A. METAL CLOSURES LTD., BROMFORD LANE, WEST BROMWICH, STAFFS.**

JUNIOR CHEMISTS experienced in synthetic detergents and surface-active chemistry required by the Gardinol Company Ltd., Huddersfield, Yorkshire (a subsidiary of Hickson & Welch (Holdings) Ltd.) Write to **MR. T. S. SMITH, THE GARDINOL CHEMICAL COMPANY, MILNSBRIDGE, HUDDERSFEILD.**

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requires an **EXPERIMENTAL OFFICER OR ASSISTANT EXPERIMENTAL OFFICER** to assist in investigations on the physico-chemical properties of high explosives, and in the application of the results to the production of charges on plant scale. Applicants should possess Higher School Certificate or equivalent qualification. A knowledge of Physical Chemistry and/or Chemical Engineering experience would be an advantage.

Salary. Experimental Officer £775 (minimum age 26) £945 p.a. Assistant Experimental Officer £310 (age 18) £685 p.a.

Superannuation. The successful applicant will be required to join the Authority's contributory scheme.

Housing. Housing accommodation will be available within a reasonable period for married officers who live outside the radius of the Establishment's transport facilities or alternatively the Authority may be able to assist successful applicants in the purchase of a house. During this period a lodging allowance may be payable.

Requests for application forms by **POST CARD** to **SENIOR RECRUITMENT OFFICER, A.W.R.E., ALDERMASTON, BERKS.** Quote reference 284/WGE/38.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY ALDERMASTON, BERKS, requires an **EXPERIMENTAL OFFICER,** to take part in the design and development of special plants involving the testing of prototype equipment, and assist in developing the final plant designs. Experience in the operation of experimental plants and an understanding of chemical engineering principles are essential. The minimum qualification is Inter. B.Sc. or Higher National Certificate in Chemical Engineering. A degree in Chemical Engineering would be an advantage. Applicants should be at least 26 years of age.

Salary £775-£945 per annum (Male). The successful applicant will be required to join the Authority's contributory superannuation scheme.

Housing accommodation will be available within a reasonable period for married officers who live outside the radius of the Establishment's transport facilities or alternatively the Authority may be able to assist successful applicants in the purchase of a house. During this period a lodging allowance may be payable.

Requests for application forms by **POST CARD** to **SENIOR RECRUITMENT OFFICER, A.W.R.E., ALDERMASTON, BERKS.** Quote reference 578/WGE/38.

THE UNITED KINGDOM ATOMIC AUTHORITY require a **CHEMICAL ENGINEER** to act as **TECHNICAL CONTROL OFFICER** at the Industrial Group Headquarters, Risley, nr. Warrington, Lancs., to be responsible to a Senior Technical Control Officer for the headquarters co-ordination of nuclear operations associated with the Group's chemical plants. Duties will involve collaboration in the development work on existing plants and its integration with future schemes arising from research, the determination of optimum operating methods and levels, target flow sheeting, costing and raw material utilisation.

Candidates must have an Honours Degree in Engineering, Chemical Engineering, or Chemistry, Corporate Membership of the Institution of Chemical Engineers or equivalent. Experience of the operation and development of conventional chemical plants is essential, and some knowledge of radio-chemical plant practices is desirable.

Salary, £1,700-£2,200 per annum (male). All new entrants under the age of 55 automatically join the Authority's Pension Scheme. A house will be available within a reasonable period for the successful candidate, if married. Send postcard for application form to the UNITED KINGDOM ATOMIC ENERGY AUTHORITY, INDUSTRIAL GROUP HEADQUARTERS, RISLEY, nr. WARRINGTON. Ref. 973 must be quoted.

HOME OFFICE—SENIOR SCIENTIFIC OFFICERS IN FORENSIC SCIENCE LABORATORIES. The Civil Service Commissioners invite applications from men for two pensionable posts: (*a*) Chemist (at Harrogate), (*b*) Biologist (at Nottingham). Age at least 32* on December 31st, 1955.

Candidates for post (*a*) should normally have 1st or 2nd Class Honours Degree in Chemistry or be A.R.I.C. or equivalent and must have sound knowledge and wide experience of modern analytical procedures. For post (*b*) candidates should normally have 1st or 2nd Class Honours Degree in Botany with subsidiary Zoology or Chemistry, or equivalent. Experience in identification of wide range of materials from biological sources is essential.

Exceptionally, for posts (*a*) and (*b*), a candidate without the academic qualification may be admitted.

Salary for 45½ hour week: Post (*a*), £999-£1,158; Post (*b*), £1,019-£1,189. Exceptionally a starting pay above minimum.

Further particulars and application form from **SECRETARY, CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, 30, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S4478/53/55. Completed application forms must be returned by July 14th, 1955.

* Candidates under age 32 on December 31st, 1955, may be considered but must apply through the open competition, quoting No. S/53/55.

6648/120/DVL 6/55.

LABORATORY SUPERINTENDENTS are being sought to take charge of product testing and process control on a shift basis for a new factory in South Wales. Bonus, generous holiday and Non-contributory Pension Scheme. Salary commensurate with age and experience. Applications to be made to **BOX No. C.A. 3413, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4,** quoting ref. D.11.

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